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SINGLE STAGE EXPERIMENTAL EVALUATION OF HIGH MACH NUMBER COMPRESSOR ROTOR BLADING PART 4 - PERFORMANCE OF ROTOR 2D

by

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prepared for

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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LYNN, MASSACHUSETTS/CINCINNATI, OHIO

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ABSTRACT

A 1400 foot per second tip speed rotor with a 0.5 hub-tip radius ratio and double-circular-arc blade sections, designed to deliver a total pressure ratio of 1.76 and a rotor adiabatic efficiency of 0.837 at a flow of 215.49 lbs/sec, was tested with uniform inlet flow. For a point at design speed, judged to have adequate stall margin for engine operation, a rotor total pressure ratio of 1.677 and an adiabatic efficiency of 0.854 at a flow of 226.0 lbs/sec were actually achieved.

SUMMARY

A 1400 foot per second tip speed rotor, designed to have a diffusion factor of 0.45 at the tip, was tested with uniform inlet flow. A double-circular-arc blade element design was used for the entire blade height. The hub-tip radius ratio at rotor inlet is 0.50. Neither inlet guide vanes nor a stator row were employed.

The rotor was designed to deliver a total-pressure ratio of 1.76 and a rotor adiabatic efficiency of 0.837 at a flow of 215.49 lbs/sec. For a point at design speed, judged to have adequate stall margin for engine operation, a rotor total pressure ratio of 1.677 and a rotor adiabatic efficiency of 0.854 at a flow of 226.0 lbs/sec were actually achieved. Peak rotor adiabatic efficiencies of 0.950, 0.958, 0.917, 0.875, and 0.814 were obtained at 50, 70, 90, 100 and 110 percent of design speed, respectively.

Blade element data were obtained from measurements over a range of speeds from 50% to 110% design speed. Results of these blade element measurements were used to show the variation of deviation angle, diffusion factor and loss coefficient as a function of incidence angle for five radial immersions. The rotor was also stalled at these speeds and overall performance data were obtained while in stall. The stall type was rotating stall at all speeds.

INTRODUCTION

In the early 1950's a test program was initiated at the NACA Lewis Laboratory to provide blade element data for double-circular-arc airfoil sections to be applied to the design of transonic rotors (ref. 1). Available experimental

and analytical data indicated that such airfoils produced a good chordwise loading and could be used in transonic compressors with resulting high efficiencies at relative Mach numbers up to 1.2 (ref. 2).

During the last fifteen years the development of axial-flow compressors for today's aircraft engines has resulted in high blade speeds and stage loadings. This leads to higher relative Mach numbers and can cause severe efficiency penalties due to the presence of shocks. It is the purpose of the current experimental program to determine the performance potential of such rotors and to obtain data that will aid in the selection of optimum blade sections.

A new type of blade shape has been employed in general for this test series. The camber line consists of two circular arcs that are mutually tangent at the point where they join. The front arc is identified as the supersonic arc, and the rear arc is identified as the subsonic arc. The term, camber ratio, refers to the ratio of the camber of the supersonic arc to the total camber. Blade elements developed in this way are called multiple-circular-arc elements; the double-circular-arc airfoil is a particular case in which the supersonic arc and the subsonic arc have the same curvature. Rotor 2D, the third of four medium-aspect-ratio rotors, has such a double-circular-arc section along the entire span. The blade shape thus represents a link between the present series of tests and the earlier NACA series. The double-circular-arc tip element has a camber ratio of 0.65 and a diffusion factor of 0.45.

Details of the design of this rotor and the other rotors to be evaluated are given in reference 3. This report presents overall performance and blade-element results of tests on Rotor 2D with a uniform inlet flow.

SYMBOLS

The following symbols are used in this report:

A	flow area, in ²
A_j	area represented by each discharge rake element. This is the area of an annulus bounded either by radii midway between those of two adjacent elements or by the hub or casing, in ²
a	distance along chord line to position where maximum perpendicular displacement between camber line and chord line occurs, in
C_h	enthalpy-equivalent static-pressure-rise coefficient,

$$C_h = \frac{2gJc_p t_1 \left[\left(\frac{p_2}{p_1} \right)^{\frac{\gamma-1}{\gamma}} - 1 \right] - (U_2^2 - U_1^2)}{V_1'^2}$$

C_p static-pressure-rise coefficient,

$$C_p = \frac{P_2 - P_1}{P'_1 - P_1}$$

c blade-chord length, in

c_p specific heat at constant pressure, Btu/lb-°R

D diffusion factor,

$$D = 1 - \frac{V'_2}{V'_1} + \frac{r_2 V_{\theta 2} - r_1 V_{\theta 1}}{2 \bar{r} \sigma V'_1}$$

g acceleration due to gravity, 32.174 ft/sec²

i incidence angle, difference between air angle and camber line angle at leading edge in cascade projection, deg

\vec{i}_κ unit vector in direction of intersection of axisymmetric stream surface and blade mean surface.

J mechanical equivalent of heat, 778.161 ft-lb/Btu

M Mach number

P total or stagnation pressure, psia

P_{in} compressor inlet average total pressure, psia

P_j arithmetic average total pressure at j immersion, psia

p static or stream pressure, psia

r radius, in

\bar{r} mean radius, average of streamline leading-edge and trailing-edge radii, in

T total or stagnation temperature, °R

T_j arithmetic average total temperature at j immersion, °R

t static or stream temperature, °R

t blade thickness, in

t_e	blade edge thickness, in
t_m	blade maximum thickness, in
U	rotor speed, ft/sec
V	air velocity, ft/sec
V_{zj}	average axial velocity at j immersion, ft/sec
w	weight flow, lb/sec
Z	displacement along compressor axis, in
β	air angle, angle whose tangent is the ratio of tangential to axial velocity, deg
γ	ratio of specific heats
γ°	blade-chord angle, angle in cascade projection between blade chord and axial direction, deg
δ	ratio: $\frac{\text{total pressure}}{\text{standard pressure}}, \frac{\text{psia}}{14.696 \text{ psia}}$
δ°	deviation angle, difference between air angle and camber line angle at trailing edge in cascade projection, deg
ϵ°	meridional angle, angle between tangent to streamline projected on meridional plane and axial direction, deg
θ	ratio: $\frac{\text{total temperature}}{\text{standard temperature}}, \frac{^\circ\text{R}}{518.688^\circ\text{R}}$
θ°	angular displacement about compressor axis, deg
η	efficiency
κ°	angle between cylindrical projection of \vec{i}_κ and axial direction, deg
ρ	static or stream density, lb-sec ² /ft ⁴
σ	solidity, ratio of chord to spacing
ϕ	camber angle, difference between angles in cascade projection of tangents to camber line at extremes of camber line arc, deg
ψ	stream function; $\psi_h = 0, \psi_c = 1$

$\bar{\omega}$ total-pressure-loss coefficient

Subscripts:

a point on camber line where maximum camber line rise occurs

ad adiabatic

an annulus value

avg arithmetic average at any plane

c tip or casing at any plane

d downstream

e equivalent two-dimensional cascade

h hub at any plane

j immersion

m meridional direction

p polytropic

s suction surface

t tip at rotor leading-edge plane

t total when referring to blade element

u upstream

z with respect to axial displacement

θ with respect to meridional displacement

1 leading edge

2 trailing edge

0.05, 0.95, 1.51, 1.57 instrumentation plane designations (fig. 5)

Superscripts:

* critical flow condition

' relative to rotor

APPARATUS AND PROCEDURE

Test Rotor

The design of the rotor used in this test investigation is presented in reference 3 in which it is identified as Rotor 2D. The rotor was designed for a corrected weight flow per unit frontal area of 29.66 lbs/sec per square foot. With the selected rotor tip diameter of 36.5 inches and the hub-tip radius ratio of 0.50, the design corrected weight flow is 215.49 lbs/sec. The selection of a rotor tip solidity of 1.3, a diffusion factor of 0.45, zero inlet swirl, a rotor tip speed of 1400 ft/sec, and an axial velocity ratio of 0.91 permitted the calculation of the change in angular momentum across the rotor at the rotor tip. This change in angular momentum, with a suitable rotor total-pressure-loss coefficient derived from the NASA method of references 4 and 5, resulted in a design rotor total-pressure ratio of 1.76. The design total-pressure ratio was held constant radially. Because the loss correlation resulted in radially varying losses, a radial variation of the change in angular momentum was used in the design vector diagram calculations.

Double-circular-arc blade sections were used in the cascade projection* over the entire radial height of the blade. The same double-circular-arc blade sections were used for all Rotors 2 from the hub outward to approximately the 60% span location. However, for this rotor the portion of the blade outboard from the shroud also had a double-circular-arc section, resulting in a camber ratio of 0.65 for the tip element.

Tabulations of the blade design data appear in table 1. A view of a portion of the assembled rotor appears in figure 1(a) and a close up of the tip section is presented in figure 1(b).

In order to assess the quality of the blading, after manufacture, the blading was inspected using the contour layouts from six of the twelve manufacturing sections for six blades selected at random. A meridional view of the rotor appears in figure 2 and the inspected sections are identified by asterisks. At each manufacturing section the average of the six blades was obtained and was compared with the design intent. The results of the comparisons of the average blade sections with design intent appear in figures 3(a) through 3(f). These results indicate that most of the sections were more closed than the design intent in the trailing portion of the blade. Further investigation revealed that there was a manufacturing discrepancy in the part-span shroud. The error in the shroud permitted the blade to open up more than design intent and partially compensated for the discrepancy in the blade-trailing edge. Final conclusions

*As described in reference 3, the cascade projection is obtained by viewing the intersection of a blade and an axisymmetric stream surface in the radial direction. The justification for the use of this projection is given in reference 6.

on the blade inspections are that generally the sections from the shroud outward were open about 0.3° and those from the shroud inward were closed about 0.3° from design intent.

The average running tip clearance at 100% speed was 0.042 inches.

Test Facility and Instrumentation

Performance tests of this rotor were made in General Electric's House Compressor Test Facility, in Lynn, Massachusetts. The general aspects of the test set-up are shown in figure 4 and described in detail in reference 7. The majority of the instrumentation was identical with that used in reference 7 and the locations are illustrated in figures 5 and 6. The difference in hub contour between Rotor 1 and Rotors 2 resulted in different radii for all of the instrumentation except the inlet pitot-static and casing boundary layer rakes. Photographs of fixed instrumentation used for Rotor 2D appear in figure 7. Photographs of the traverse probes and the hot-wire probes are presented in figure 8.

General Test Procedure

The following test sequence was followed in general during the testing of this rotor. With the throttle valve set to deliver approximately the design total-pressure ratio at 100% corrected speed, data were recorded from fixed instrumentation at 50%, 70%, 90%, 100% and 110% corrected speeds. (When only fixed instrumentation measurements are taken, the data readings are termed green readings). The test rotor was returned to 50% corrected speed and the throttle valve closed until the limit of stall-free operation was achieved. With the throttle re-set so that the vehicle operated as close to stall as feasible, blade-element data and a green reading were recorded. This procedure was repeated at 70, 90, 100, and 110 percent corrected speed to establish the limit of stall-free operation and to obtain blade element and green reading data early in the test. Blade element and green reading data were then recorded over the remaining range of stall-free operation up to the maximum facility flow capacity for 100%, 90% and 110% design speed.

Difficulties were encountered in determining the total-pressure ratio for green reading data at 50% and 70% corrected speeds. The level of the absolute total pressure at the rotor discharge was below the high accuracy range of the transducers for these conditions. The data recording system was modified for these speeds to record the discharge total pressures as differential pressures with the manifolded inlet total pressure as the reference. This method resulted in more reliable green reading data at 50% and 70% design speeds.

Blade element and green reading data were recorded over the remaining portion of the stall-free operating range up to the maximum facility flow capacity for 50 and 70 percent corrected speed.

Prior to the conclusion of the test the throttle valve was closed until the rotor was operating in stall where green reading and hot-wire data were recorded at each speed.

Testing in the Stall-Free Region

For all speeds the throttle positions at which data were recorded in the stall-free region of operation were generally selected to permit ease in defining the speed line and to document the peak efficiency. At low speeds this led to a relatively even spacing whereas at higher speeds the throttle positions were concentrated in the higher pressure ratio region where incidence variations occur.

At the rotor inlet traverse location, the static pressure wedge was set to zero flow direction and the cobra probe was allowed to seek its nulled position. At the rotor exit traverse location the static pressure wedge was manually rotated to the angle orientation established by the nulled position of the cobra probe; since stationary vane rows and struts were relatively far removed from this plane, circumferential variations of angle were presumed to be sufficiently small not to affect the pressure read by the wedge static probe. Probe immersion indicators and the probe aerodynamic parameters were connected to conventional X-Y plotting equipment. In general, continuous traverses were only recorded for the rotor exit flow angle; these were used to give an indication of the radial extent of the part span shroud wake. Recording of data from the traversing probes at the standard immersions was achieved by means of a digitized read-out on punched paper tape, as was also the case for the recording of data from fixed instrumentation.

Testing in the Stalled Region

Rotating stalls were encountered, on closing the throttle valve, at all speeds. The rotor was stalled twice at each speed, the limit of stall-free operation being established by closing the throttle valve slowly until distinct changes in the stress levels and performance were noted. For the first stall at each speed the three traverse hot-wire anemometer probes were immersed at the 10%, 50% and 70% immersions. In this way a knowledge of the radial extent of the rotating stall cells was gained. For the second stall the hot-wire anemometer probes were all set at the 10% immersion so that information was obtained from which the speed and number of rotating stall cells could be deduced. A green reading was recorded simultaneously with the hot-wire data with the rotor in stall.

RESULTS AND DISCUSSION

Overall Performance

The compressor map of the test rotor is shown in figure 9. The inlet total-temperature level was established as the arithmetic average of 24 inlet

temperatures measured in the low velocity region at the facility inlet screen (fig. 4). The rotor exit total-temperature and total-pressure ratio were established on the basis of fixed probe readings by a mass weighting routine, as follows. At each immersion, measurements from all circumferential locations were arithmetically averaged. The static pressure was assumed to vary linearly from hub to casing based on the measured average hub and casing values. With static pressure, total pressure, and total temperature known, static density and absolute velocity were computed at each immersion. The tangential velocity was obtained from the total-temperature rise and the Euler turbomachinery equation, and this, together with the absolute velocity and the design meridional streamline angle, gave the axial velocity. The discharge total-temperature and total-pressure ratio were then obtained from the following equations:

$$T = \frac{\sum_{j=1}^5 T_j \rho_j V_{zj} A_j}{\sum_{j=1}^5 \rho_j V_{zj} A_j} \quad , \quad (1)$$

$$\frac{P}{P_{in}} = \left\{ \frac{\sum_{j=1}^5 \left[\left(\frac{P_j}{P_{in}} \right)^{\frac{\gamma-1}{\gamma}} - 1 \right] \rho_j V_{zj} A_j}{\sum_{j=1}^5 \rho_j V_{zj} A_j} + 1 \right\}^{\frac{\gamma}{\gamma-1}} \quad . \quad (2)$$

These quantities were used with the real gas properties of dry air to compute the rotor adiabatic and polytropic efficiencies.

The corrected weight flow was obtained from the calibrated venturi flow nozzles. For several points close to stall at 50% corrected speed the measurements of flow obtained from the venturi flow nozzles proved unreliable. A similar problem was encountered during the testing of Rotor 1B (ref. 7) and was resolved by establishing a relationship between the integrated flow from the rotor inlet traverse probe and the nozzle flow. Using this correlation and the integrated flow, the compressor flow was determined for all of the data at 50% corrected speed.

In reference 7, the performance at 100% corrected speed was compared with the design point by passing a constant throttle line through the design point and noting the intersection with the 100% corrected speed line. When this procedure is used on the Rotor 2D performance map (fig. 9) the resulting operating condition is too close to stall. For conditions at design speed, judged to have adequate stall margin for engine operation, a rotor total-pressure ratio of 1.677 and a rotor adiabatic efficiency of 0.854 were

actually achieved at a flow of 226.0 lbs/sec. The rotor was designed to deliver a total-pressure ratio of 1.76 and a rotor adiabatic efficiency of 0.837 at a flow of 215.49 lbs/sec. Peak rotor adiabatic efficiencies of 0.950, 0.958, 0.917, 0.875, and 0.814, were obtained at 50, 70, 90, 100, and 110 percent of design speed respectively. A completed listing of the overall performance data (green readings) appears in table 2.

Stall Performance

The throttle position representing the limit of stall-free performance of the rotor as the throttle is closed was recorded. With this information and performance data at throttle positions close to the stall throttle position it is possible to extrapolate each speed line on the compressor map to the limit of stall-free operation. The stall line determined in this manner is shown in figure 9. The overall performance measurements, recorded while the rotor was operating with stall present, appear as solid symbols in figure 9. The flow was quite unsteady for these readings leaving the absolute accuracy open to question, but indicating a notable decrease in performance.

Samples of the hot-wire anemometer data appear in figure 10. These are copies of Visicorder traces from the three anemometers. In figure 10(a) the anemometers are at immersions of 10%, 50% and 70%. A study of such traces gives an indication of the radial extent of the stall cells. In figure 10(b) all of the anemometers are at 10% immersion. The amplitude of the trace in figure 10(b) at the 111° position is greater than the correct level due to a data recording error. Under ideal conditions the trace in figure 10(a) at the 10% immersion would be identical to the trace in figure 10(b) at the 33° position since both are recorded at the same radial and circumferential location. Examination of these two traces reveals a general similarity but they are not identical because of slight variations in data recording techniques.

The number and speed of the rotating stall cells was calculated using the method described in reference 7 on traces similar to figure 10(b). These data and other stall performance information are presented in figure 10(c).

Blade-Element Performance

For presentation of the data from traverse probes located upstream and downstream of the rotor, a method of adjusting the data to obtain conditions at the blade edges was used. Knowing the measured total pressure, total temperature, static pressure and flow angle at each immersion and using the design meridional streamline angle, the meridional Mach number and all velocity components at each measurement plane may be calculated. Application of the condition of constant angular momentum along design streamlines yields the tangential velocity at each blade edge. It is assumed that the shape of each meridional stream tube, between a measurement plane and its

adjacent blade edge, remains fixed at the design shape for all data conditions. The meridional Mach number at a measurement plane may then be used to determine the meridional Mach number at the blade edge by use of the relationship shown in figure 11. This method is not strictly correct at the trailing edge where there may be an appreciable swirl velocity together with a change in radius between the edge and the measurement plane. Nevertheless, since the radius changes are not large, the method should be a very good approximation. With the tangential velocities and the meridional Mach numbers at the edges thus obtained, and with measured stagnation conditions assumed to be constant along the design streamlines, the velocities, Mach numbers, and all of their components may be determined at the blade edges. The constant physical quantities used in these computations at the measurement planes and at the edges are given in table 3.

In order to check out this procedure and to determine small differences due to calculation technique, design values of total pressure, total temperature, static pressure and flow angle were used in a simple calculation. Treating this information as though it were test data, the calculation routine was used to give design point blade element performance, yielding the data listed in table 4. Some indication of the small differences which can occur is indicated in table 4 by the leading edge and trailing edge check weight flow/nozzle weight flow ratios. The integrated flow at the upstream (plane 0.95) and downstream (plane 1.51) measurement planes is divided by the nozzle flow, which was set equal to the design flow for the check case. Table 5 is included to give a more complete description of the abbreviations used.

Complete listings of blade element data are given in table 6 and graphs of some blade element data, plotted as a function of incidence angle, are presented in figure 12.

Measurements of discharge stagnation temperature taken from the fixed instrumentation were judged to be more reliable than those from the cobra traversing probes. Efficiency, loss coefficient and loss parameter were therefore processed by separate computation, using fixed instrumentation stagnation temperatures and pressures in conjunction with the inlet relative Mach number obtained from the traverse probe data. The results of this computation are given as an addition in table 6 and loss coefficients obtained in this way are plotted in figure 12.

Examination of the blade-element data and the flow angle traverses in the rotor discharge plane revealed that the 50% immersion data were partially immersed in the wake of the part-span shroud. Similar results were observed and illustrated in figure 14 of reference 7 and figure 13 of reference 8. This effect can be seen in some of the unusually high values of loss coefficient for the third radial position on the blade-element data. Generally the influence of the shroud wake on the 50% immersion reading increased when the throttle position was close to stall or approaching maximum facility flow.

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Table 1. - Cascade Projection Data for Rotor 2D Blade Setting.

ψ	$\frac{r_1}{r_t}$	β_1'	i	κ_1'	$\kappa_{s1}' - \kappa_1'$	$\frac{t_{e1}}{c_t}$
1.0	.9963	64.65	3.29	61.36	3.30	.0059
.9	.9600	62.76	3.68	59.08	3.71	.0062
.8	.9228	61.74	4.10	57.64	4.11	.0065
.7	.8841	60.66	4.52	56.14	4.50	.0069
.6	.8435	59.64	4.94	54.70	4.97	.0072
.5	.8005	58.55	5.35	53.20	5.45	.0076
.4	.7540	57.27	5.82	51.45	5.91	.0079
.3	.7046	56.20	6.10	50.10	6.36	.0083
.2	.6492	55.53	6.09	49.44	6.80	.0088
.1	.5850	56.18	5.90	50.28	7.23	.0093
0	.4995	61.18	5.70	55.48	7.56	.0100

ψ	$\frac{r_2}{r_t}$	β_2'	δ°	κ_2'	β_{2e}'	$\frac{t_{e2}}{c_t}$
1.0	.9794	54.52	3.48	51.04	53.41	.0060
.9	.9485	54.13	3.72	50.41	50.18	.0063
.8	.9157	52.77	3.92	48.85	47.77	.0066
.7	.8815	50.72	4.15	46.57	45.09	.0070
.6	.8454	47.78	4.57	43.21	41.71	.0074
.5	.8070	44.05	5.05	39.00	37.76	.0078
.4	.7675	39.12	5.73	33.39	32.78	.0082
.3	.7257	33.36	6.71	26.65	27.15	.0086
.2	.6824	26.32	8.21	18.11	19.68	.0091
.1	.6378	18.34	10.70	7.64	8.52	.0095
0	.5912	10.18	16.82	-6.64	-19.05	.0100

ψ	$\frac{t_m}{c_t}$	γ°	$\frac{a}{c_t}$	σ	ϕ_t
1.0	.0350	56.19	.500	1.3063	10.33
.9	.0387	54.74	.500	1.3523	8.67
.8	.0426	53.24	.500	1.4038	8.79
.7	.0466	51.35	.500	1.4618	9.57
.6	.0510	48.95	.500	1.5281	11.49
.5	.0556	46.10	.500	1.6055	14.20
.4	.0604	42.42	.500	1.6963	18.06
.3	.0655	38.37	.500	1.8044	23.45
.2	.0708	33.77	.500	1.9382	31.33
.1	.0770	28.96	.500	2.1106	42.64
0	.0850	24.42	.500	2.3663	62.12

Table 2. - Overall Performance based on Fixed Instrumentation

Rdg.*	Total press. ratio	Rotor adiab. eff.	Corrected weight flow lb/sec	Rotor speed, percent design	Throttle valve setting	Operating mode	**Pressure measurement system
1	1.153	.9640	124.35	50.02	11.7	Stall free	Abs.
2	1.322	.9545	174.63	70.03	11.7	Stall free	Abs.
3	1.620	.9089	212.70	90.05	11.7	Stall free	Abs.
4	1.785	.8697	224.69	100.10	11.7	Stall free	Abs.
5	1.837	.8063	233.60	110.06	13.0	Stall free	Abs.
6T	1.174	.9055	99.4	50.03	5.0	Stall free	Abs.
7T	1.361	.8950	149.26	70.05	6.5	Stall free	Abs.
8T	1.671	.8910	201.26	90.05	9.4	Stall free	Abs.
9T	1.824	.8657	223.56	100.06	10.9	Stall free	Abs.
10T	1.943	.8118	232.99	110.05	11.5	Stall free	Abs.
11T	1.369	.7775	225.67	99.98	50.0	Stall free	Abs.
12T	1.566	.8275	226.40	100.03	15.0	Stall free	Abs.
13T	1.612	.8313	226.08	99.98	14.0	Stall free	Abs.
14T	1.685	.8551	225.76	100.02	13.0	Stall free	Abs.
15T	1.738	.8725	225.91	99.90	12.3	Stall free	Abs.
16T	1.782	.8715	225.24	100.06	11.7	Stall free	Abs.
17T	1.805	.8815	224.31	99.94	11.3	Stall free	Abs.
18T	1.318	.8318	215.50	90.02	50.0	Stall free	Abs.
19T	1.509	.8980	216.05	90.03	14.0	Stall free	Abs.
20T	1.556	.8996	214.88	90.04	13.0	Stall free	Abs.
21T	1.115	.9341	144.0	50.05	50.0	Stall free	Diff.
22T	1.124	.9504	137.5	49.96	25.0	Stall free	Diff.
23T	1.140	.9445	127.2	50.02	15.0	Stall free	Diff.
24T	1.149	.9221	121.6	50.01	11.7	Stall free	Diff.
25T	1.157	.9253	114.8	50.04	9.0	Stall free	Diff.
26T	1.164	.9138	107.4	50.01	7.0	Stall free	Diff.
27T	1.215	.9006	187.52	70.06	50.0	Stall free	Diff.
28T	1.291	.9471	179.75	69.97	15.0	Stall free	Diff.
29T	1.313	.9683	174.55	69.96	12.3	Stall free	Diff.
30T	1.319	.9494	172.76	70.02	11.7	Stall free	Diff.
31T	1.346	.9407	163.61	70.04	9.0	Stall free	Diff.
32T	1.355	.9204	154.06	69.91	7.5	Stall free	Diff.
33T	1.621	.9180	212.89	90.02	11.0	Stall free	Abs.
34T	1.646	.9174	209.41	90.00	11.0	Stall free	Abs.
35T	1.659	.9156	205.74	89.97	10.3	Stall free	Abs.
36T	1.440	.7455	233.90	110.01	50.0	Stall free	Abs.
37T	1.748	.7944	233.91	110.14	14.0	Stall free	Abs.
38T	1.829	.8099	233.84	109.99	13.0	Stall free	Abs.
39T	1.889	.8138	233.13	110.03	12.3	Stall free	Abs.
40T	1.908	.8128	233.00	109.95	12.0	Stall free	Abs.
41T	1.932	.8131	232.06	110.04	11.7	Stall free	Abs.
42	1.934	.8136	232.45	110.08	11.7	Stall free	Abs.
43	1.784	.8711	225.66	100.06	11.7	Stall free	Abs.
44	1.807	.8766	224.31	100.14	11.3	Stall free	Abs.
45	1.824	.8741	223.54	100.17	11.0	Stall free	Abs.
46	1.687	.8544	225.52	100.05	13.0	Stall free	Abs.
47	1.623	.9123	212.06	90.12	11.7	Stall free	Abs.
48	1.381	.9617	183.87	75.06	11.7	Stall free	Abs.
49	1.325	.9579	172.71	70.10	11.7	Stall free	Abs.
50	1.226	.9655	146.17	60.07	11.7	Stall free	Abs.
51	1.154	.9611	122.83	50.06	11.7	Stall free	Abs.
52	1.883	.7699	220.26	110.11	10.7	Stalled	Abs.
53	1.740	.8018	207.55	100.09	10.1	Stalled	Abs.
54	1.587	.8046	184.22	90.10	8.4	Stalled	Abs.
55	1.277	.7354	128.02	70.01	5.4	Stalled	Abs.
56	1.151	.7877	91.03	50.04	4.1	Stalled	Abs.

*The letter "T" following the reading number indicates Blade-Element Performance data were recorded.

**Abs. - Instrumentation arranged to record absolute pressure at rotor inlet and exit.

Diff. - Instrumentation arranged to record difference between rotor inlet and exit pressures.

Table 3. - Constants Used in Data Analysis Methods
Columns list data in order of increasing immersion number

Parameter	Plane 0.95	Edge 1	Edge 2	Plane 1.51	Plane 1.57
A_j	1.3108 1.1849 1.0814 1.0567 1.0967			1.0320 .9483 .8661 .7831 .7001	1.0067 .9206 .8285 .7593 .7043
r_j	18.323 17.473 15.733 14.023 12.191 10.023 8.550	18.182 17.392 15.759 14.180 12.456 10.494 9.116	17.887 17.201 15.768 14.354 12.921 11.516 10.789	17.838 17.148 15.770 14.391 13.012 11.634 10.944	17.836 17.166 15.817 14.501 13.198 11.864 11.169
ϵ_j°	-1.57 1.85 6.10 11.76 20.40	-4.50 1.00 5.70 12.25 22.20	-4.00 -0.50 3.00 7.00 13.40	-.68 .28 2.51 5.68 9.72	-.07 .32 .42 .33 .13
$\kappa_j^{\circ} (\kappa_j^{\circ} s_j)$		58.78 (62.55) 55.39 (60.14) 52.25 (57.96) 49.71 (56.28) 50.6 (57.88)	50.18 45.03 36.17 23.45 5.78		

+ first and last values are casing and hub radii, respectively. Radii are in inches. Frontal Area = 7.2660
Annulus Area = 5.4495

$\left(\frac{w}{w^*}\right)_1$ $\left(\frac{w}{w^*}\right)_u$	1.0906 1.0762 1.0709 1.0802 1.0582
$\left(\frac{w}{w^*}\right)_2$ $\left(\frac{w}{w^*}\right)_d$.9827 .9720 .9696 .9745 .9794
\bar{r}_j (Used for Diffusion Factor)	17.283 15.768 14.272 12.738 11.023
σ_j (Used for Diffusion Factor)	1.363 1.494 1.650 1.849 2.136

Table 4. - Listing of Check Case for Blade Element Results Using Design Data.

N.A.S.A. COMPRESSOR OUTPUT DATA														
BLADE ELEMENT PERFORMANCE RESULTS														
POINT NUMBER		READING NUMBER		1		DATE		4/14/1967						
RADIAL POSITION	REL. INLET FLOW ANG.	INCID ANG MN.CMBR.LN	INCID ANG SUCT.SURF	INLET REL MACH NO.	INLET REL VELOCITY	MOTOR SPD AT INLET	INLET ABS VELOCITY	INLET ABS MACH NO.	INLET AX. VELOCITY					
1	62.625	3.845	8.075	1.4012	1503.455	1334.214	693.000	0.646	690.864					
2	60.159	4.769	0.019	1.2991	1393.785	1208.940	693.614	0.646	693.508					
3	57.957	5.707	-0.003	1.1964	1285.123	1087.808	684.262	0.637	680.879					
4	55.725	6.015	-0.555	1.0823	1164.969	955.553	666.387	0.619	651.214					
5	56.874	6.274	-1.006	0.9055	984.885	805.039	567.370	0.522	525.312					
RADIAL POSITION	REL. EXIT FLOW ANG.	REL. DEV. ANG. T.E.	REL. TURN ANGLE	EXIT REL. MACH NO.	EXIT REL. VELOCITY	MOTOR SPD AT EXIT	EXIT ABS VELOCITY	EXIT ABS MACH NO.	EXIT AX. VELOCITY					
1	54.224	4.044	8.401	0.8332	985.726	1319.562	777.226	0.657	575.793					
2	49.376	4.346	10.784	0.7335	864.366	1209.630	785.432	0.670	562.776					
3	41.761	5.591	16.196	0.6467	757.839	1101.156	822.263	0.702	564.862					
4	30.561	7.111	25.165	0.5993	695.226	991.225	876.914	0.796	595.334					
5	17.164	11.384	39.710	0.6221	709.745	883.441	960.912	0.842	661.221					
RADIAL POSITION	DIFFUSION FACTOR	ST. PRESS RISE COEFF	CH1	INLET ABS TANG. VEL	EXIT ABS TANG. VEL	INLET REL TANG. VEL	EXIT REL TANG. VEL	AXIAL VEL. RATIO						
1	0.471	0.33999	0.4556	0.	520.502	1334.214	799.060	0.833						
2	0.513	0.41049	0.4987	0.	553.591	1208.940	656.040	0.811						
3	0.552	0.47039	0.5299	0.	596.801	1087.808	504.356	0.830						
4	0.554	0.51484	0.5276	0.	639.696	955.553	351.529	0.914						
5	0.448	0.47302	0.3837	0.	679.209	805.039	204.233	1.259						
RADIAL POSITION	ADIABATIC EFFICIENCY	POLYTROPIC EFFICIENCY	TOT. PRESS RATIO	TOT. TEMP RATIO	ABS. INLET FLOW ANG.	ABS. EXIT FLOW ANG.								
1	0.7961	0.8116	1.760	1.220	0.	42.113								
2	0.8177	0.8316	1.760	1.215	0.	44.529								
3	0.8321	0.8449	1.760	1.211	0.	46.575								
4	0.8628	0.8733	1.760	1.203	0.	47.057								
5	0.9106	0.9174	1.760	1.193	0.	45.769								
TRAVERSE PRESSURE RATIO = 1.7600							PRESSURE RATIO = 1.7600							
TRAVERSE ADIABATIC EFF. = 0.8376							ADIABATIC EFF. = 0.8370							
TRAVERSE POLYTROPIC EFF. = 0.8500							POLYTROPIC EFF. = 0.8400							
FLOW COEFFICIENT L.E. = 0.990							NOZZLE WEIGHT FLOW = 215.49							
FLOW COEFFICIENT T.E. = 0.950							CHECK WEIGHT FLOW/NOZ. WEIGHT FLOW = 1.00324							
PERCENT DESIGN SPEED = 100							T.E. CHECK WEIGHT FLOW/NOZ. WEIGHT FLOW = 1.00408							

Table 5. - Simulated Listing for Symbolic Identification of Column Headings.

RADIAL POSITION	REL. INLET FLOW ANG.	INCID ANG MN. CMBR. LN	INCID ANG SUCT. SURF	INLET REL MACH NO.	INLET REL VELOCITY	ROTOR SPD AT INLET	INLET ABS MACH NO.	INLET AX. VELOCITY
1	β_1'	i	$\beta_1' - \kappa_{s1}'$	M_1'	V_1'	U_1	M_1	V_{z1}
2								
3								
4								
5								
RADIAL POSITION	REL. EXIT FLOW ANG.	REL. DEV. ANG. T.E.	REL. TURN ANGLE	EXIT REL. MACH NO.	EXIT REL. VELOCITY	ROTOR SPD AT EXIT	EXIT ABS MACH NO.	EXIT AX. VELOCITY
1	β_2'	δ°	$\Delta\beta'$	M_2'	V_2'	U_2	M_2	V_{z2}
2								
3								
4								
5								
RADIAL POSITION	DIFFUSION FACTOR	ST. PRESS. RISE COEFF	CM1	C_h	$V_{\theta 1}$	EXIT ABS TANG. VEL	EXIT REL TANG. VEL	AXIAL VEL. RATIO
1								$\frac{V_{z2}}{V_{z1}}$
2								
3								
4								
5								
RADIAL POSITION	ADIABATIC EFFICIENCY	POLYTROPIC EFFICIENCY	TOT. PRESS. RATIO	TOT. TEMP. RATIO	β_1	ABS. INLET FLOW ANG.	ABS. EXIT FLOW ANG.	
1	η_{ad}	η_p	$\frac{P_{1.51}}{P_{0.95}}$	$\frac{T_{1.51}}{T_{0.95}}$	β_1		β_2	
2								
3								
4								
5								
TRAVERSE PRESSURE RATIO =								
TRAVERSE ADIABATIC EFF. =								
TRAVERSE POLYTROPIC EFF. =								
FLOW COEFFICIENT L.E. =								
FLOW COEFFICIENT T.E. =								
FIXED INSTRUMENTATION								
PRESSURE RATIO =								
ADIABATIC EFF. =								
POLYTROPIC EFF. =								
NOZZLE WEIGHT FLOW =								
L.E. CHECK WEIGHT FLOW/NOZ. WEIGHT FLOW =								
T.E. CHECK WEIGHT FLOW/NOZ. WEIGHT FLOW =								

PARAMETERS DETERMINED FROM FIXED INSTRUMENTATION

RADIAL POSITION	TOT. PRESS LOSS PARAM	ADIABATIC EFFICIENCY	LOSS COEFFICIENT	TOT. PRESS. RATIO	TOT. TEMP. RATIO
1					
2					
3					
4					
5					

Table 6. - Listing of Blade Element Performance

NASA - TASK 1 (ROTOR 2D)

N.A.S.A. COMPRESSOR OUTPUT DATA
BLADE ELEMENT PERFORMANCE RESULTS

POINT NUMBER 6 READING NUMBER 6 DATE 4/27/1967

RADIAL POSITION	REL. INLET FLOW ANG.	INCIN ANG MN. CMBR. LN	SUCT. SURF	INLET REL MACH NO.	INLET REL VELOCITY	ROTOR SPD AT INLET	INLET ABS VELOCITY	INLET ABS MACH NO.	INLET AX. VELOCITY
1	68.805	10.025	6.255	0.6428	716.207	667.489	259.635	0.233	298.835
2	55.712	10.322	5.572	0.5966	663.563	604.816	272.971	0.245	292.930
3	63.484	11.234	5.524	0.5479	608.794	544.216	272.873	0.246	291.924
4	61.096	11.386	4.816	0.4940	549.075	478.050	270.096	0.243	263.946
5	61.245	10.685	3.405	0.4207	467.971	402.750	238.305	0.214	220.640

RADIAL POSITION	REL. EXIT FLOW ANG.	REL. TURN ANGLE	EXIT REL. MACH NO.	EXIT REL. VELOCITY	ROTOR SPD AT EXIT	EXIT ABS VELOCITY	EXIT ABS MACH NO.	EXIT AX. VELOCITY
1	53.373	3.193	0.4073	465.053	660.159	359.675	0.350	297.210
2	48.868	3.838	0.4015	455.207	605.162	398.083	0.351	299.429
3	43.645	7.475	0.3273	370.734	550.894	399.009	0.352	268.081
4	31.871	6.421	0.3302	372.552	495.896	436.651	0.387	314.679
5	15.606	9.826	0.3233	363.258	441.974	493.052	0.439	341.004

RADIAL POSITION	DIFFUSION FACTOR	ST. PRESS RISE COEFF	CHI	INLET ABS TANG. VEL	EXIT ABS TANG. VEL	INLET REL TANG. VEL	EXIT REL TANG. VEL	AXIAL VEL. RATIO
1	0.497	0.36161	0.4039	0.	287.261	667.489	372.898	1.071
2	0.446	0.43916	0.4555	0.	262.308	604.816	342.853	1.097
3	0.539	0.48299	0.4815	0.	295.201	544.216	255.693	0.987
4	0.471	0.53739	0.4945	0.	300.247	478.050	195.650	1.192
5	0.405	0.51417	0.3737	0.	346.722	402.750	95.251	1.546

RADIAL POSITION	ADIBATIC EFFICIENCY	POLYTROPIC EFFICIENCY	TOT. PRESS RATIO	TOT. TEMP RATIO	ABS. INLET FLOW ANG.	ABS. EXIT FLOW ANG.
1	0.7084	0.7148	1.170	1.065	0.	46.020
2	0.8643	0.8673	1.168	1.053	0.	41.219
3	0.8283	0.8319	1.159	1.052	0.	47.756
4	0.9227	0.9244	1.168	1.049	0.	43.655
5	0.9588	0.9598	1.179	1.050	0.	45.476

TRAVERSE PRESSURE RATIO	=	1.1689
TRAVERSE ADIBATIC EFF.	=	0.8439
TRAVERSE POLYTROPIC EFF.	=	0.8473
FLOW COEFFICIENT L.E.	=	0.980
FLOW COEFFICIENT T.E.	=	0.950
PERCENT DESIGN SPEED	=	50

FIXED INSTRUMENTATION	PRESSURE RATIO	=	1.1740
	ADIBATIC EFF.	=	0.9055
	POLYTROPIC EFF.	=	0.9077
	NOZTLE WEIGHT FLOW	=	105.39
L.F. CHECK WEIGHT FLOW/NOZ.	WEIGHT FLOW	=	0.94799
T.F. CHECK WEIGHT FLOW/NOZ.	WEIGHT FLOW	=	0.94051

PARAMETERS DETERMINED FROM FIXED INSTRUMENTATION

RADIAL POSITION	TOT. PRESS LOSS PARAM	ADIBATIC EFFICIENCY	LOSS COEFFICIENT	TOT. PRESS RATIO	TOT. TEMP RATIO
1	0.0475	0.7391	0.2170	1.172	1.063
2	0.0180	0.8985	0.0819	1.174	1.052
3	0.0159	0.9187	0.0724	1.168	1.049
4	0.0030	0.9873	0.0132	1.174	1.047
5	-0.0110	1.0344	-0.0487	1.183	1.048

Table 6. - Listing of Blade Element Performance (continued).

NASA - TASK 1 (ROTOR 2D)									
N.A.S.A.- COMPRESSOR OUTPUT DATA									
BLADE ELEMENT PERFORMANCE RESULTS									
POINT NUMBER		7		HEADING NUMBER		7		DATE 4/27/1967	
RADIAL POSITION	REL. INLET FLOW ANG.	INCID. ANG. MN. CMR. LN	SUCT. SURF. ANGLE	INLET REL. MACH NO.	INLET REL. VELOCITY	ROTOR SPD. AT INLET	INLET ARS VELOCITY	INLET ABS. MACH NO.	INLET AX. VELOCITY
1	66.220	7.440	3.670	0.9238	1021.861	934.634	413.109	0.373	411.835
2	63.607	6.217	3.467	0.8570	945.452	846.878	420.330	0.381	420.266
3	61.711	9.461	3.751	0.7855	866.347	762.024	412.162	0.374	410.124
4	59.457	9.727	3.157	0.7092	782.098	669.377	404.489	0.367	395.279
5	56.838	9.238	1.958	0.6021	665.818	563.940	353.957	0.320	327.718
RADIAL POSITION	REL. EXIT FLOW ANG.	REL. DEV. ANG. T.E.	REL. TURN ANGLE	EXIT REL. MACH NO.	EXIT REL. VELOCITY	ROTOR SPD. AT EXIT	EXIT ARS VELOCITY	EXIT ABS. MACH NO.	EXIT AX. VELOCITY
1	52.521	2.341	13.699	0.5772	648.699	924.370	566.960	0.489	406.514
2	49.682	3.602	14.975	0.5337	613.603	847.362	560.476	0.487	405.522
3	47.766	7.616	17.925	0.4364	500.807	771.374	558.197	0.486	361.290
4	54.574	8.124	27.863	0.4426	504.000	694.366	609.648	0.535	427.060
5	51.429	10.049	44.010	0.4331	489.857	618.862	679.524	0.601	459.371
RADIAL POSITION	DIFFUSION FACTOR	ST. PRESS. RISE COEFF	CH1	INLET ARS TANG. VEL	EXIT ARS TANG. VEL	INLET REL. TANG. VFL	EXIT REL. TANG. VFL	AXIAL VFL. RATIO	
1	0.486	0.37974	0.4457	0.	394.185	934.634	1530.185	0.987	
2	0.488	0.44650	0.4862	0.	386.876	846.878	460.486	0.965	
3	0.571	0.49925	0.5163	0.	425.082	762.024	346.292	0.881	
4	0.507	0.55985	0.5332	0.	431.904	669.377	262.462	1.080	
5	0.444	0.55115	0.4260	0.	488.625	563.940	130.237	1.402	
RADIAL POSITION	ADIABATIC EFFICIENCY	POLYTROPIC EFFICIENCY	TOT. PRESS. RATIO	TOT. TEMP. RATIO	ARS. INLET FLOW ANG.	ABS. EXIT FLOW ANG.			
1	0.7906	0.7997	1.369	1.119	0.	44.118			
2	0.8608	0.8667	1.357	1.106	0.	43.652			
3	0.8329	0.8396	1.336	1.104	0.	49.638			
4	0.9224	0.9257	1.355	1.099	0.	45.323			
5	0.9485	0.9508	1.371	1.100	0.	46.768			
TRANSVERSE PRESSURE RATIO = 1.3582									
TRANSVERSE ADIABATIC EFF. = 0.8629									
TRANSVERSE POLYTROPIC EFF. = 0.8687									
FLOW COEFFICIENT T.E. = 0.980									
FLOW COEFFICIENT T.E. = 0.950									
PERCENT DESIGN SPEED = 70									
PRESSURE RATIO = 1.3610									
ADIABATIC EFF. = 0.8950									
POLYTROPIC EFF. = 0.8995									
NOZZLE WEIGHT FLOW = 149.24									
L.E. CHECK WEIGHT FLOW/NOZ. WEIGHT FLOW = 0.98344									
T.E. CHECK WEIGHT FLOW/NOZ. WEIGHT FLOW = 0.95102									

PARAMETERS DETERMINED FROM FIXED INSTRUMENTATION

RADIAL POSITION	TOT. PRESS. LOSS PARAM	ADIABATIC EFFICIENCY	LOSS COEFFICIENT	TOT. PRESS. RATIO	TOT. TEMP. RATIO
1	0.0399	0.7877	0.1789	1.367	1.119
2	0.0221	0.8835	0.0997	1.361	1.104
3	0.0222	0.8926	0.1013	1.347	1.100
4	0.0071	0.9712	0.0307	1.356	1.094
5	0.0050	0.9848	0.0222	1.372	1.096

Table 6. - Listing of Blade Element Performance (continued).

NASA - TASK I (ROTOR 2D)

N.A.S.A. COMPRESSOR OUTPUT DATA

BLADE ELEMENT PERFORMANCE RESULTS

POINT NUMBER 8 HEADING NUMBER 8 DATE - 4/27/1967

RADIAL POSITION	REL. INLET FLOW ANG.	INCID. ANG. MN. CMBR. LN	INCID. ANG. SUCT. SURF	INLET REL. MACH NO.	INLET REL. VELOCITY	ROTOR SPD. AT INLET	INLET ARS VELOCITY	INLET ABS. MACH NO.	INLET AX. VELOCITY
1	53.199	4.419	0.649	1.2366	1346.900	1201.452	608.812	0.559	606.935
2	59.802	4.472	-0.278	1.1624	1258.863	1088.643	632.133	0.584	632.037
3	57.792	5.542	-0.168	1.0712	1159.351	979.565	620.119	0.573	617.053
4	55.806	6.096	-0.474	0.9666	1048.013	860.470	598.266	0.552	584.645
5	56.873	6.273	-1.007	0.8111	846.900	724.933	510.944	0.467	493.068
RADIAL POSITION	REL. EXIT FLOW ANG.	REL. DEV. ANG. T.E.	REL. TURN ANGLE	EXIT REL. MACH NO.	EXIT REL. VELOCITY	ROTOR SPD. AT EXIT	EXIT ARS VELOCITY	EXIT ARS MACH NO.	EXIT AX. VELOCITY
1	51.211	1.231	11.987	0.6807	809.677	1188.258	754.401	0.634	506.735
2	46.879	1.849	12.983	0.6564	770.298	1049.265	744.988	0.635	526.524
3	41.234	5.064	16.559	0.5880	686.138	991.585	746.877	0.640	545.596
4	33.269	9.818	22.538	0.5617	648.347	892.592	765.175	0.663	539.260
5	18.111	12.331	38.762	0.5280	604.090	795.534	840.476	0.735	559.986
RADIAL POSITION	DIFFUSION FACTOR	ST. PRESS. RISE COEFF	CH1	INLET ARS TANG. VEL	EXIT ARS TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	AXIAL VEL. RATIO	
1	0.550	0.40789	0.5071	0.	557.750	1201.452	630.508	0.835	
2	0.528	0.48898	0.5613	0.	527.028	1088.643	562.237	0.833	
3	0.550	0.55743	0.6008	0.	539.681	979.565	451.904	0.836	
4	0.522	0.61158	0.5086	0.	538.801	860.470	353.791	0.922	
5	0.488	0.61072	0.5097	0.	612.387	724.933	183.147	1.184	
RADIAL POSITION	ADIABATIC EFFICIENCY	POLYTROPIC EFFICIENCY	TOT. PRESS. RATIO	TOT. TEMP. RATIO	ABS. INLET FLOW ANG.	ABS. EXIT FLOW ANG.			
1	0.7917	0.8071	1.729	1.214	0.	47.744			
2	0.8764	0.8854	1.709	1.189	0.	45.027			
3	0.9822	0.8905	1.678	1.181	0.	46.307			
4	0.9333	0.9378	1.641	1.163	0.	44.976			
5	0.9331	0.9376	1.640	1.163	0.	47.559			
TRAVERSE PRESSURE RATIO = 1.6710									
TRAVERSE ADIABATIC EFF. = 0.8910									
TRAVERSE POLYTROPIC EFF. = 0.8986									
FLOW COEFFICIENT T.E. = 201.26									
FLOW COEFFICIENT T.E. = 0.99499									
PERCENT DESIGN SPEED = 90									

PARAMETERS DETERMINED FROM FIXED INSTRUMENTATION

RADIAL POSITION	TOT. PRESS LOSS PARAM	ADIABATIC EFFICIENCY	LOSS COEFFICIENT	TOT. PRESS. RATIO	TOT. TEMP. RATIO
1	0.0479	0.7778	0.2086	1.697	1.210
2	0.0224	0.8964	0.0978	1.710	1.185
3	0.0195	0.9141	0.0858	1.672	1.173
4	0.0067	0.9723	0.0297	1.638	1.156
5	0.0165	0.9475	0.0740	1.620	1.156

Table 6. - Listing of Blade Element Performance (continued).

NASA - TASK 1 (ROTOR 2D)

N.A.S.A. COMPRESSOR OUTPUT DATA

BLADE ELEMENT PERFORMANCE RESULTS

POINT NUMBER 9 READING NUMBER 9 DATE 4/27/1967

RADIAL POSITION	REL. INLET FLOW ANG.	INCID. ANG. MW. CHBL. LN	INCID. ANG. SUCT. SURF	INLET REL. MACH NO.	INLET REL. VELOCITY	ROTOR SPD. AT INLET	INLET ABS. VELOCITY	INLET ABS. MACH NO.	INLET AX. VELOCITY
1	62.201	3.421	-0.349	1.4038	1510.216	1335.019	706.028	0.656	703.852
2	59.147	3.757	-0.993	1.3149	1409.135	1209.669	722.745	0.674	722.635
3	56.832	4.582	-1.128	1.2161	1302.260	1088.464	714.930	0.668	711.396
4	54.632	4.922	-1.643	1.1016	1181.736	956.129	694.490	0.647	678.677
5	55.650	5.060	-2.220	0.9232	1001.072	805.525	594.368	0.548	550.308
RADIAL POSITION	REL. EXIT FLOW ANG.	REL. DEV. ANG. T.E.	REL. TURN ANGLE	EXIT REL. MACH NO.	EXIT REL. VELOCITY	ROTOR SPD. AT EXIT	EXIT ABS. VELOCITY	EXIT ABS. MACH NO.	EXIT AX. VELOCITY
1	44.919	-1.261	13.281	0.7490	901.551	1320.358	873.744	0.726	591.803
2	46.561	1.531	12.585	0.7344	868.144	1210.360	832.302	0.704	596.906
3	42.351	6.181	14.481	0.6102	722.172	1101.821	815.018	0.689	533.306
4	31.240	7.790	23.392	0.6190	719.336	991.823	874.744	0.753	611.674
5	20.353	14.573	35.302	0.5713	658.064	883.974	905.232	0.786	602.122
RADIAL POSITION	DIFFUSION FACTOR	ST. PRESS. RISE COEFF	CH1	INLET ABS. TANG. VEL	EXIT ABS. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	AXIAL VEL. RATIO	
1	0.558	0.36648	0.4838	0.	641.498	1335.019	678.860	0.841	
2	0.522	0.46022	0.5500	0.	580.003	1209.669	630.357	0.826	
3	0.590	0.53250	0.5922	0.	615.677	1088.464	486.144	0.750	
4	0.535	0.59031	0.6024	0.	620.799	956.129	371.024	0.901	
5	0.504	0.58738	0.5015	0.	660.544	805.525	223.430	1.094	
RADIAL POSITION	ADIBATIC EFFICIENCY	POLYTROPIC EFFICIENCY	TOT. PRESS. RATIO	TOT. TEMP. RATIO	ARS. INLET FLOW ANG.	ARS. EXIT FLOW ANG.			
1	0.7437	0.7660	1.920	1.276	0.	47.307			
2	0.8798	0.8901	1.890	1.227	0.	44.177			
3	0.8145	0.8294	1.819	1.229	0.	49.101			
4	0.9207	0.9272	1.838	1.207	0.	45.424			
5	0.8659	0.8946	1.755	1.197	0.	47.649			
TRAVERSE PRESSURE RATIO = 1.8523									
TRAVERSE ADIBATIC EFF. = 0.8362									
TRAVERSE POLYTROPIC EFF. = 0.8493									
FLOW COEFFICIENT C.E. = 0.980									
FLOW COEFFICIENT I.E. = 0.950									
PERCENT DESIGN SPEED = 100									
FIXED INSTRUMENTATION PRESSURE RATIO = 1.8240									
ADIBATIC EFF. = 0.8657									
POLYTROPIC EFF. = 0.8766									
NOZZLE WEIGHT FLOW = 223.56									
L.E. CHECK WEIGHT FLOW/NOZ. WEIGHT FLOW = 0.9A472									
T.F. CHECK WEIGHT FLOW/NOZ. WEIGHT FLOW = 0.9A753									

PARAMETERS DETERMINED FROM FIXED INSTRUMENTATION

RADIAL POSITION	TOT. PRESS. LOSS PARAM	ADIBATIC EFFICIENCY	LOSS COEFFICIENT	TOT. PRESS. RATIO	TOT. TEMP. RATIO
1	0.0575	0.7499	0.2387	1.845	1.255
2	0.0277	0.8754	0.1203	1.874	1.225
3	0.0309	0.8649	0.1378	1.814	1.215
4	0.0094	0.9629	0.0408	1.823	1.194
5	0.0215	0.9278	0.0978	1.737	1.184

Table 6. -Listing of Blade Element Performance (continued).

NASA - TASK I (ROTOR 2D)

N.A.S.A. COMPRESSOR OUTPUT DATA

BLADE ELEMENT PERFORMANCE RESULTS

POINT NUMBER 10 READING NUMBER 10 DATE 4/27/1967

RADIAL POSITION	REL. INLET FLOW ANG.	INLET A/G ANGLE	INLET REL. MACH NO.	INLET REL. VELOCITY	ROTOR SPD. AT INLET	INLET ABS. VELOCITY	INLET ABS. MACH NO.	INLET AX. VELOCITY
1	3.775	0.005	1.5509	1655.589	1468.288	744.922	0.717	762.564
2	32.839	-0.301	1.4469	1538.804	1330.425	773.231	0.727	773.113
3	57.618	-0.352	1.3352	1419.747	1197.121	743.270	0.718	759.496
4	55.505	-0.775	1.2061	1285.526	1051.576	739.437	0.694	722.601
5	56.427	-1.453	1.0100	1090.062	885.937	635.098	0.588	588.019
RADIAL POSITION	REL. EXIT FLOW ANG.	REL. DEV. ANG. T.E.	REL. TURN ANGLE	EXIT REL. MACH NO.	EXIT REL. VELOCITY	ROTOR SPD. AT EXIT	EXIT ABS. MACH NO.	EXIT AX. VELOCITY
1	43.522	-1.528	14.002	0.8154	993.148	1452.144	0.794	656.699
2	45.543	1.553	13.256	0.6017	955.721	1331.185	0.768	656.853
3	45.291	9.191	12.347	0.6172	738.520	1211.811	0.721	519.477
4	25.912	2.462	29.593	0.6632	774.237	1090.832	0.840	692.191
5	17.546	11.356	38.841	0.6656	765.454	972.218	0.909	711.563
RADIAL POSITION	DIFFUSION FACTOR	ST. PRESS. RISE COEFF	CH1	INLET ABS. TANG. VEL	EXIT ABS. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	AXIAL VEL. RATIO
1	0.556	0.29346	0.4229	0.	708.536	1468.288	743.627	0.861
2	0.517	0.38504	0.4903	0.	636.986	1330.425	694.199	0.850
3	0.427	0.45122	0.5268	0.	687.583	1197.121	524.227	0.684
4	0.559	0.48292	0.5100	0.	754.542	1051.576	336.290	0.958
5	0.465	0.48502	0.4074	0.	746.694	885.937	225.523	1.210

RADIAL POSITION	AD. EFF.	POLYTROPIC EFF.	TOT. PRESS. RATIO	TOT. TEMP. RATIO	ARS. INLET FLOW ANG.	ABS. EXIT FLOW ANG.
1	0.5646	0.6954	2.008	1.332	0.	47.174
2	0.5060	0.8239	1.999	1.272	0.	44.120
3	0.7259	0.7404	1.865	1.269	0.	52.929
4	0.3500	0.8647	2.037	1.265	0.	47.468
5	0.3830	0.8934	1.951	1.239	0.	46.380

TRAVERSE PRESSURE RATIO = 1.9777
 TRAVERSE ADIABATIC EFF. = 0.7726
 TRAVERSE POLYTROPIC EFF. = 0.7933
 FLOW COEFFICIENT C.F. = 0.980
 FLOW COEFFICIENT C.E. = 0.950
 PERCENT DESIGN SPEED = 110

FIXED INSTRUMENTATION PRESSURE RATIO = 1.9430
 ADIABATIC EFF. = 0.8118
 POLYTROPIC EFF. = 0.8285
 NOZZLE WEIGHT FLOW = 232.99
 L.F. CHECK WEIGHT FLOW/NOZ. WEIGHT FLOW = 0.98238
 T.E. CHECK WEIGHT FLOW/NOZ. WEIGHT FLOW = 1.01059

PARAMETERS DETERMINED FROM FIXED INSTRUMENTATION

RADIAL POSITION	TOT. PRESS. LOSS PARAM	ADIABATIC EFFICIENCY	LOSS COEFFICIENT	TOT. PRESS. RATIO	TOT. TEMP. RATIO
1	0.0702	0.7020	0.2891	1.949	1.299
2	0.0412	0.8198	0.1792	1.995	1.266
3	0.0465	0.8870	0.2181	1.870	1.249
4	0.0388	0.8619	0.1593	1.932	1.240
5	0.0198	0.9383	0.0887	1.957	1.225

Table 6. - Listing of Blade Element Performance (continued).

NASA - TASK 1 (ROTOR 2D)

N.A.S.A. COMPRESSOR OUTPUT DATA
BLADE ELEMENT PERFORMANCE RESULTS

POINT NUMBER 11 READING NUMBER 11 DATE 4/27/1967

RADIAL POSITION	REL. INLET FLOW ANG.	INCID. ANG. MN. COMP. LN	INCID. ANG. SUCT. SURF	INLET REL. MACH NO.	INLET REL. VELOCITY	ROTOR SPD. AT INLET	INLET ARS. VELOCITY	INLET ARS. MACH NO.	INLET AX. VELOCITY
1	61.247	2.317	-1.253	1.4222	1522.017	1334.035	732.726	0.685	730.467
2	56.601	3.211	-1.1539	1.3265	1416.213	1208.778	737.914	0.691	737.602
3	56.443	4.233	-1.477	1.2233	1306.562	1087.662	723.945	0.678	720.366
4	54.713	4.603	-1.967	1.1042	1185.723	955.424	702.213	0.656	686.225
5	52.954	4.364	-2.915	0.9334	1009.693	804.931	609.542	0.564	564.376
RADIAL POSITION	REL. EXIT FLOW ANG.	REL. DEV. ANG. I.E.	REL. TURN ANGLE	EXIT REL. MACH NO.	EXIT REL. VELOCITY	ROTOR SPD. AT EXIT	EXIT ARS. VELOCITY	EXIT ARS. MACH NO.	EXIT AX. VELOCITY
1	51.531	3.354	7.764	1.2151	1347.271	1319.385	836.278	0.754	800.082
2	52.237	7.357	6.014	1.0510	1190.094	1209.468	769.931	0.636	723.041
3	49.044	12.224	7.389	0.8831	999.537	1101.008	740.797	0.654	654.126
4	51.192	7.742	23.120	0.9168	1016.302	991.092	988.690	0.892	864.623
5	14.719	10.729	38.255	0.8829	944.837	843.323	1110.578	1.016	900.944
RADIAL POSITION	DIFFUSION FACTOR	ST. PRESS RISE COEFF	CH1	INLET ARS. TANG. VEL	EXIT ARS. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	AXIAL VFL. RATIO	
1	0.172	0.09424	0.1544	0.	236.851	1334.035	1082.534	1.095	
2	0.222	0.15895	0.2188	0.	244.219	1208.778	945.250	0.980	
3	0.116	0.18816	0.2288	0.	346.013	1067.662	754.995	0.908	
4	0.251	0.16546	0.1600	0.	447.616	955.424	523.476	1.260	
5	0.193	0.01541	-0.1108	0.	612.875	804.931	270.448	1.596	
RADIAL POSITION	ADIABATIC EFFICIENCY	POLYTROPIC EFFICIENCY	TOT. PRESS RATIO	TOT. TEMP RATIO	ABS. INLET FLOW ANG.	ABS. EXIT FLOW ANG.			
1	0.3220	0.8285	1.295	1.094	0.	16.491			
2	0.7423	0.7515	1.292	1.103	0.	20.074			
3	0.3780	0.5914	1.257	1.117	0.	27.878			
4	0.2369	0.8456	1.496	1.146	0.	28.406			
5	0.3722	0.8801	1.573	1.159	0.	34.226			

TRAVERSE PRESSURE RATIO = 1.3740
 TRAVERSE ADIABATIC EFF. = 0.7835
 TRAVERSE POLYTROPIC EFF. = 0.7930
 FLOW COEFFICIENT C.E. = 0.980
 FLOW COEFFICIENT T.E. = 0.950
 PERCENT DESIGN SPEED = 100

PARAMETERS DETERMINED FROM FIXED INSTRUMENTATION

RADIAL POSITION	TOT. PRESS LOSS PARAM	ADIABATIC EFFICIENCY	LOSS COEFFICIENT	TOT. PRESS RATIO	TOT. TEMP RATIO
1	0.0197	0.7865	0.0905	1.291	1.096
2	0.0301	0.7111	0.1480	1.301	1.110
3	0.0436	0.6079	0.2197	1.256	1.111
4	0.0196	0.8925	0.0849	1.489	1.135
5	0.0462	0.8241	0.2061	1.548	1.161

Table 6. - Listing of Blade Element Performance (continued).

NASA - TASK I (ROTOR 2D)																								
N.A.S.A. COMPRESSOR OUTPUT DATA																								
BLADE ELEMENT PERFORMANCE RESULTS																								
POINT NUMBER 12 READING NUMBER 12 DATE 4/27/1967																								
RADIAL POSITION	REL. INLET FLOW ANG.	INCID. ANG. MN. CMBR. LN	INCID. ANG. SUCT. SURF	INLET REL. MACH NO.	INLET REL. VELOCITY	ROTOR SPD. AT INLET	INLET ARS. VELOCITY	INLET ARS. MACH NO.	INLET AX. VELOCITY	REL. EXIT FLOW ANG.	REL. DEV. ANG. T.E.	DIFFUSION FACTOR	ST. PRESS. RISE COEFF	CH1	INLET ARS. TANG. VEL	EXIT ARS. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL
1	61.248	2.468	-1.302	1.4222	1593.417	1334.633	734.542	0.686	732.278						0.3444	0.	1334.633	1917.193	1334.633	1917.193	1334.633	1917.193	1334.633	1917.193
2	58.569	3.179	-1.571	1.3277	1417.334	1209.320	739.176	0.692	739.063						0.3966	0.	1209.320	810.051	1209.320	810.051	1209.320	810.051	1209.320	810.051
3	56.491	4.241	-1.469	1.2227	1307.031	1088.150	724.059	0.677	720.479						0.3943	0.	1088.150	609.612	1088.150	609.612	1088.150	609.612	1088.150	609.612
4	54.339	4.629	-1.941	1.1077	1185.846	955.853	701.838	0.656	685.858						0.3698	0.	955.853	466.523	955.853	466.523	955.853	466.523	955.853	466.523
5	54.946	4.386	-2.894	0.9328	1009.838	805.292	609.325	0.563	564.156						0.1140	0.	805.292	247.262	805.292	247.262	805.292	247.262	805.292	247.262
RADIAL POSITION	REL. EXIT FLOW ANG.	REL. DEV. ANG. T.E.	REL. TURN ANGLE	EXIT REL. MACH NO.	EXIT REL. VELOCITY	ROTOR SPD. AT EXIT	EXIT ARS. VELOCITY	EXIT ARS. MACH NO.	EXIT AX. VELOCITY	ABS. EXIT FLOW ANG.	AD. PRESS. RATIO	AD. EFF.	POLY. EFF.	L.E. COEFF.	T.E. COEFF.	PERCENT DESIGN SPEED	TRAVERSE PRESS. RATIO	TRAVERSE AD. EFF.	TRAVERSE POLY. EFF.	FLOW COEFF. L.E.	FLOW COEFF. T.E.	PERCENT DESIGN SPEED		
1	52.723	2.543	8.524	0.9959	1153.691	1319.976	807.463	0.697	698.125		1.5659	0.8006	0.8128	0.980	0.950	100	1.5659	0.8006	0.8128	0.980	0.950	100		
2	50.623	5.593	7.947	0.9086	1047.971	1210.010	775.904	0.673	664.850															
3	47.860	11.690	8.631	0.7078	892.631	1101.502	739.629	0.636	551.597															
4	32.673	9.223	21.666	0.7636	868.782	991.536	901.541	0.792	727.434															
5	17.076	11.296	37.910	0.7730	863.610	883.719	1043.916	0.934	804.930															
RADIAL POSITION	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL
1	0.	402.783	0.	399.959	0.	491.891	0.	525.013	0.	636.457	0.	1334.633	1209.320	1088.150	955.853	805.292	0.	29.983	31.030	41.725	35.819	38.333		
2	0.	399.959	0.	491.891	0.	525.013	0.	636.457	0.	636.457	0.	1209.320	1088.150	955.853	805.292	805.292	0.	29.983	31.030	41.725	35.819	38.333		
3	0.	491.891	0.	525.013	0.	636.457	0.	636.457	0.	636.457	0.	1088.150	955.853	805.292	805.292	805.292	0.	29.983	31.030	41.725	35.819	38.333		
4	0.	525.013	0.	636.457	0.	636.457	0.	636.457	0.	636.457	0.	955.853	805.292	805.292	805.292	805.292	0.	29.983	31.030	41.725	35.819	38.333		
5	0.	636.457	0.	636.457	0.	636.457	0.	636.457	0.	636.457	0.	805.292	805.292	805.292	805.292	805.292	0.	29.983	31.030	41.725	35.819	38.333		
RADIAL POSITION	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL
1	0.	402.783	0.	399.959	0.	491.891	0.	525.013	0.	636.457	0.	1334.633	1209.320	1088.150	955.853	805.292	0.	29.983	31.030	41.725	35.819	38.333		
2	0.	399.959	0.	491.891	0.	525.013	0.	636.457	0.	636.457	0.	1209.320	1088.150	955.853	805.292	805.292	0.	29.983	31.030	41.725	35.819	38.333		
3	0.	491.891	0.	525.013	0.	636.457	0.	636.457	0.	636.457	0.	1088.150	955.853	805.292	805.292	805.292	0.	29.983	31.030	41.725	35.819	38.333		
4	0.	525.013	0.	636.457	0.	636.457	0.	636.457	0.	636.457	0.	955.853	805.292	805.292	805.292	805.292	0.	29.983	31.030	41.725	35.819	38.333		
5	0.	636.457	0.	636.457	0.	636.457	0.	636.457	0.	636.457	0.	805.292	805.292	805.292	805.292	805.292	0.	29.983	31.030	41.725	35.819	38.333		
RADIAL POSITION	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL
1	0.	402.783	0.	399.959	0.	491.891	0.	525.013	0.	636.457	0.	1334.633	1209.320	1088.150	955.853	805.292	0.	29.983	31.030	41.725	35.819	38.333		
2	0.	399.959	0.	491.891	0.	525.013	0.	636.457	0.	636.457	0.	1209.320	1088.150	955.853	805.292	805.292	0.	29.983	31.030	41.725	35.819	38.333		
3	0.	491.891	0.	525.013	0.	636.457	0.	636.457	0.	636.457	0.	1088.150	955.853	805.292	805.292	805.292	0.	29.983	31.030	41.725	35.819	38.333		
4	0.	525.013	0.	636.457	0.	636.457	0.	636.457	0.	636.457	0.	955.853	805.292	805.292	805.292	805.292	0.	29.983	31.030	41.725	35.819	38.333		
5	0.	636.457	0.	636.457	0.	636.457	0.	636.457	0.	636.457	0.	805.292	805.292	805.292	805.292	805.292	0.	29.983	31.030	41.725	35.819	38.333		
RADIAL POSITION	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL
1	0.	402.783	0.	399.959	0.	491.891	0.	525.013	0.	636.457	0.	1334.633	1209.320	1088.150	955.853	805.292	0.	29.983	31.030	41.725	35.819	38.333		
2	0.	399.959	0.	491.891	0.	525.013	0.	636.457	0.	636.457	0.	1209.320	1088.150	955.853	805.292	805.292	0.	29.983	31.030	41.725	35.819	38.333		
3	0.	491.891	0.	525.013	0.	636.457	0.	636.457	0.	636.457	0.	1088.150	955.853	805.292	805.292	805.292	0.	29.983	31.030	41.725	35.819	38.333		
4	0.	525.013	0.	636.457	0.	636.457	0.	636.457	0.	636.457	0.	955.853	805.292	805.292	805.292	805.292	0.	29.983	31.030	41.725	35.819	38.333		
5	0.	636.457	0.	636.457	0.	636.457	0.	636.457	0.	636.457	0.	805.292	805.292	805.292	805.292	805.292	0.	29.983	31.030	41.725	35.819	38.333		
RADIAL POSITION	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL
1	0.	402.783	0.	399.959	0.	491.891	0.	525.013	0.	636.457	0.	1334.633	1209.320	1088.150	955.853	805.292	0.	29.983	31.030	41.725	35.819	38.333		
2	0.	399.959	0.	491.891	0.	525.013	0.	636.457	0.	636.457	0.	1209.320	1088.150	955.853	805.292	805.292	0.	29.983	31.030	41.725	35.819	38.333		
3	0.	491.891	0.	525.013	0.	636.457	0.	636.457	0.	636.457	0.	1088.150	955.853	805.292	805.292	805.292	0.	29.983	31.030	41.725	35.819	38.333		
4	0.	525.013	0.	636.457	0.	636.457	0.	636.457	0.	636.457	0.	955.853	805.292	805.292	805.292	805.292	0.	29.983	31.030	41.725	35.819	38.333		
5	0.	636.457	0.	636.457	0.	636.457	0.	636.457	0.	636.457	0.	805.292	805.292	805.292	805.292	805.292	0.	29.983	31.030	41.725	35.819	38.333		
RADIAL POSITION	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL
1	0.	402.783	0.	399.959	0.	491.891	0.	525.013	0.	636.457	0.	1334.633	1209.320	1088.150	955.853	805.292	0.	29.983	31.030	41.725	35.819	38.333		
2	0.	399.959	0.	491.891	0.	525.013	0.	636.457	0.	636.457	0.	1209.320	1088.150	955.853	805.292	805.292	0.	29.983	31.030	41.725	35.819	38.333		
3	0.	491.891	0.	525.013	0.	636.457	0.	636.457	0.	636.457	0.	1088.150	955.853	805.292	805.292	805.292	0.	29.983	31.030	41.725	35.819	38.333		
4	0.	525.013	0.	636.457	0.	636.457	0.	636.457	0.	636.457	0.	955.853	805.292	805.292	805.292	805.292	0.	29.983	31.030	41.725	35.819	38.333		
5	0.	636.457	0.	636.457	0.	636.457	0.	636.457	0.	636.457	0.	805.292	805.292	805.292	805.292	805.292	0.	29.983	31.030	41.725	35.819	38.333		
RADIAL POSITION	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL
1	0.	402.783	0.	399.959	0.	491.891	0.	525.013	0.	636.457	0.	1334.633	1209.320	1088.150	955.853	805.292	0.	29.983	31.030	41.725	35.819	38.333		
2	0.	399.959	0.	491.891	0.	525.013	0.	636.457	0.	636.457	0.	1209.320	1088.150	955.853	805.292	805.292	0.	29.983	31.030	41.725	35.819	38.333		
3	0.	491.891	0.	525.013	0.	636.457	0.	636.457	0.	636.457	0.	108												

Table 6. - Listing of Blade Element Performance (continued).

NASA - TASK 1 (ROTOR 2D)											
N.A.S.A. COMPRESSOR OUTPUT DATA											
BLADE ELEMENT PERFORMANCE RESULTS											
POINT NUMBER		13	READING NUMBER	13	DATE	4/27/1967					
RADIAL POSITION	RFL. INLET FLOW ANG.	INCID ANG MN. CMR. LN	INCID ANG SUCT. SURF	INLET REL MACH NO.	INLET REL VELOCITY	ROTOR SPD AT INLET	INLET ARS VELOCITY	INLET ABS MACH NO.	INLET ABS VELOCITY	INLET AX. VELOCITY	
1	61.184	2.404	-1.366	1.4233	1523.619	1333.995	736.119	0.688	733.850		
2	54.550	3.160	-1.590	1.3272	1416.950	1208.741	739.386	0.693	739.273		
3	56.559	4.309	-1.401	1.2208	1305.370	1087.630	721.840	0.675	718.271		
4	54.612	4.902	-1.668	1.1024	1181.133	955.396	694.473	0.648	678.661		
5	55.458	4.958	-2.422	0.9262	1002.992	804.907	598.430	0.553	594.069		
RADIAL POSITION	RFL. EXIT FLOW ANG.	REL. DEV. ANG. T.E.	REL. TURN ANGLE	EXIT REL. MACH NO.	EXIT REL. VELOCITY	ROTOR SPD AT EXIT	EXIT ARS VELOCITY	EXIT ABS MACH NO.	EXIT ABS VELOCITY	EXIT AX. VELOCITY	
1	52.324	2.144	8.860	0.9603	1120.806	1319.345	811.324	0.695	684.408		
2	49.031	4.301	9.519	0.8820	1021.061	1209.432	800.292	0.691	669.453		
3	45.711	9.541	10.848	0.6818	795.426	1100.976	769.371	0.659	555.860		
4	31.454	8.404	22.758	0.7347	838.427	991.062	901.571	0.790	708.313		
5	16.146	10.366	39.312	0.7462	836.007	883.296	1038.643	0.927	782.799		
RADIAL POSITION	DIFFUSION FACTOR	ST. PRESS RISE COEFF	CH1	INLET ABS TANG. VEL	EXIT ABS TANG. VEL	EXIT ARS TANG. VEL	INLET RFL TANG. VEL	EXIT REL TANG. VEL	AXIAL VFL. RATIO		
1	0.368	0.26706	0.3770	0.	433.061	1333.995	1333.995	686.284	0.933		
2	0.383	0.33496	0.4233	0.	438.481	1208.741	1208.741	770.951	0.906		
3	0.515	0.36210	0.4235	0.	531.972	1087.630	1087.630	569.904	0.773		
4	0.418	0.39708	0.4139	0.	550.961	955.396	955.396	440.101	1.044		
5	0.327	0.23683	0.1439	0.	656.679	804.907	804.907	226.618	1.413		
RADIAL POSITION	ADIABATIC EFFICIENCY	POLYTROPIC EFFICIENCY	TOT. PRESS RATIO	TOT. TEMP RATIO	FIXED INSTRUMENTATION PRESSURE RATIO	ADIABATIC EFF.	POLYTROPIC EFF.	NOZZLE WEIGHT FLOW	NOZZLE WEIGHT FLOW	NOZZLE WEIGHT FLOW	NOZZLE WEIGHT FLOW
1	0.7737	0.7886	1.622	1.192				226.08	0.98535	1.08925	
2	0.9473	0.8575	1.627	1.176							
3	0.6807	0.6990	1.520	1.187							
4	0.8713	0.8801	1.654	1.178							
5	0.8566	0.8664	1.664	1.183							
PARAMETERS DETERMINED FROM FIXED INSTRUMENTATION											
RADIAL POSITION	TOT. PRESS LOSS PARAM	ADIABATIC EFFICIENCY	LOSS COEFFICIENT	TOT. PRESS RATIO	TOT. TEMP RATIO						
1	0.0404	0.7579	0.1804	1.593	1.188						
2	0.0293	0.8300	0.1336	1.620	1.178						
3	0.0399	0.7725	0.1886	1.543	1.171						
4	0.0149	0.9325	0.0648	1.659	1.167						
5	0.0342	0.8813	0.1521	1.653	1.175						

Table 6. - Listing of Blade Element Performance (continued).

NASA - TASK 1 (ROTOR 2D)													
N.A.S.A. COMPRESSOR OUTPUT DATA													
BLADE ELEMENT PERFORMANCE RESULTS													
POINT NUMBER 14 READING NUMBER 14 DATE 4/27/1967													
RADIAL POSITION	REL. INLET FLOW ANG.	INCID ANG MN. CMR. LN	INCID ANG SUCT. SURF	INLET REL MACH NO.	INLET REL VELOCITY	ROTOR SPD AT INLET	INLET ABS VELOCITY	INLET ABS MACH NO.	INLET AX. VELOCITY				
1	61.411	2.631	-1.139	1.4193	1520.876	1334.500	729.502	0.681	727.253				
2	58.648	3.258	-1.492	1.3255	1416.011	1209.199	736.834	0.690	736.722				
3	56.531	4.281	-1.429	1.2219	1306.289	1088.041	722.881	0.676	719.307				
4	54.353	4.643	-1.927	1.1063	1185.514	955.758	701.406	0.655	685.436				
5	55.156	4.556	-2.724	0.9302	1007.427	805.212	605.428	0.559	560.548				
RADIAL POSITION	REL. EXIT FLOW ANG.	REL. DEV. ANG. T.E.	REL. TURN ANGLE	EXIT REL. MACH NO.	EXIT REL. VELOCITY	ROTOR SPD AT EXIT	EXIT ABS VELOCITY	EXIT ABS MACH NO.	EXIT AX. VELOCITY				
1	51.574	1.394	91.838	0.9172	1079.717	1319.845	822.852	0.699	670.422				
2	48.551	3.521	10.096	0.8319	970.570	1209.890	803.430	0.689	642.455				
3	44.096	7.926	12.436	0.6538	767.586	1101.392	791.525	0.674	590.875				
4	31.962	6.512	22.392	0.6912	795.348	991.437	886.111	0.770	671.144				
5	17.773	11.993	37.384	0.6766	767.479	883.631	982.893	0.866	712.740				
RADIAL POSITION	DIFFUSION FACTOR	ST. PRESS. RISE COEFF	CH1	INLET ABS TANG. VEL	EXIT ABS TANG. VEL	INLET REL TANG. VEL	EXIT REL TANG. VEL	AXIAL VEL. RATIO					
1	0.404	0.29669	0.4101	0.	474.785	1334.500	845.059	0.922					
2	0.429	0.37912	0.4697	0.	482.410	1209.199	727.480	0.872					
3	0.545	0.42663	0.4899	0.	567.640	1088.041	933.753	0.766					
4	0.462	0.47981	0.4977	0.	572.685	955.758	418.753	0.979					
5	0.397	0.38441	0.3023	0.	655.171	805.212	228.460	1.272					
RADIAL POSITION	ADIABATIC EFFICIENCY	POLYTROPIC EFFICIENCY	TOT. PRESS. RATIO	TOT. TEMP. RATIO	ABS. INLET FLOW ANG.	ABS. EXIT FLOW ANG.							
1	0.7687	0.7853	1.701	1.213	0.	35.306							
2	0.8560	0.8665	1.707	1.193	0.	36.902							
3	0.7323	0.7501	1.635	1.206	0.	45.859							
4	0.8926	0.9005	1.724	1.189	0.	40.474							
5	0.8693	0.8787	1.699	1.189	0.	42.590							
TRAVERSE PRESSURE RATIO = 1.6950													
TRAVERSE ADIABATIC EFF. = 0.8190													
TRAVERSE POLYTROPIC EFF. = 0.8320													
FLOW COEFFICIENT L.E. = 0.960													
FLOW COEFFICIENT T.E. = 0.950													
PERCENT DESIGN SPEED = 100													
PARAMETERS DETERMINED FROM FIXED INSTRUMENTATION													
RADIAL POSITION	TOT. PRESS. LOSS PARAM	ADIABATIC EFFICIENCY	LOSS COEFFICIENT	TOT. PRESS. RATIO	TOT. TEMP. RATIO								
1	0.0442	0.7601	0.1939	1.669	1.207								
2	0.0270	0.8548	0.1220	1.701	1.192								
3	0.0347	0.8226	0.1596	1.649	1.187								
4	0.0106	0.9539	0.0462	1.721	1.176								
5	0.0226	0.9207	0.1015	1.685	1.175								
L.E. CHECK WEIGHT FLOW/NOZ. WEIGHT FLOW = 0.98622													
T.E. CHECK WEIGHT FLOW/NOZ. WEIGHT FLOW = 1.00932													

Table 6. - Listing of Blade Element Performance (continued).

NASA - TASK I (ROTAR 2D)

N.A.S.A. COMPRESSOR OUTPUT DATA

BLADE ELEMENT PERFORMANCE RESULTS

POINT NUMBER 15 READING NUMBER 15 DATE 4/27/1967

RADIAL POSITION	REL. INLET FLOW ANG.	INCID. ANG. MN. CHDR. LN	INCID. ANG. SUCT. SURF	INLET REL. MACH NO.	INLET REL. VELOCITY	ROTOR SPD AT INLET	INLET ARS VELOCITY	INLET ARS MACH NO.	INLET AX. VELOCITY	
1	61.444	2.664	-1.106	1.4179	1518.591	1332.907	727.652	0.679	725.409	
2	56.649	3.259	-1.491	1.3227	1414.305	1207.756	735.924	0.688	735.812	
3	56.758	4.508	-1.202	1.2177	1301.317	1086.743	715.834	0.670	712.294	
4	54.482	4.772	-1.798	1.1037	1182.142	954.617	697.256	0.651	681.380	
5	56.506	4.906	-2.374	0.9245	1001.530	804.251	596.861	0.551	552.616	
RADIAL POSITION	REL. EXIT FLOW ANG.	REL. DEV. ANG. T.E.	REL. TURN ANGLE	EXIT REL. MACH NO.	EXIT REL. VELOCITY	ROTOR SPD AT EXIT	EXIT ARS MACH NO.	EXIT ARS VELOCITY	EXIT AX. VELOCITY	
1	50.805	0.625	10.639	0.8631	1023.733	1318.269	0.703	646.329	646.329	
2	47.727	2.697	10.922	0.7690	922.524	1208.445	0.693	622.557	622.557	
3	42.959	6.782	13.795	0.6399	752.569	1100.078	0.685	550.361	550.361	
4	31.239	7.789	23.243	0.6702	773.409	990.254	0.770	657.660	657.660	
5	12.426	13.646	36.080	0.6304	720.282	882.576	0.823	662.755	662.755	
RADIAL POSITION	DIFFUSION FACTOR	ST. PRESS RISE COEFF	CHI	INLET ABS TANG. VEL	EXIT ARS TANG. VEL	EXIT REL TANG. VEL	EXIT REL TANG. ANG.	EXIT REL TANG. VEL	AXIAL VFL. RATIO	
1	0.452	0.32627	0.4425	0.	525.649	1332.907	792.620	0.891	0.891	
2	0.470	0.40914	0.5001	0.	523.618	1207.756	684.827	0.846	0.846	
3	0.559	0.46310	0.5256	0.	587.602	1086.743	512.475	0.773	0.773	
4	0.483	0.52081	0.5371	0.	591.349	954.617	398.905	0.965	0.965	
5	0.439	0.47654	0.3938	0.	648.841	804.251	233.735	1.199	1.199	
RADIAL POSITION	ADIABATIC EFFICIENCY	POLYTROPIC EFFICIENCY	TOT. PRESS RATIO	TOT. TEMP RATIO	PRESSURE RATIO	ADIABATIC EFF.	POLYTROPIC EFF.	NOZZLE WEIGHT FLOW	L.E. CHECK WEIGHT FLOW/NOZ.	T.E. CHECK WEIGHT FLOW/NOZ.
1	0.7590	0.7774	1.776	1.235	1.7380	0.8725	0.8821	225.91	0.98336	1.00432
2	0.6565	0.8657	1.768	1.206	1.735	0.8725	0.8821	225.91	0.98336	1.00432
3	0.7640	0.7811	1.709	1.217	1.735	0.8725	0.8821	225.91	0.98336	1.00432
4	0.9026	0.9103	1.777	1.198	1.735	0.8725	0.8821	225.91	0.98336	1.00432
5	0.8697	0.8792	1.716	1.192	1.735	0.8725	0.8821	225.91	0.98336	1.00432
PERCENT DESIGN SPEED = 100										
TRAVERSE PRESSURE RATIO = 1.7526										
TRAVERSE ADIABATIC EFF. = 0.8232										
TRAVERSE POLYTROPIC EFF. = 0.8366										
FLOW COEFFICIENT L.E. = 0.960										
FLOW COEFFICIENT T.E. = 0.950										
PERCENT DESIGN SPEED = 100										

PARAMETERS DETERMINED FROM FIXED INSTRUMENTATION

RADIAL POSITION	TOT. PRESS LOSS PARAM	ADIABATIC EFFICIENCY	LOSS COEFFICIENT	TOT. PRESS RATIO	TOT. TEMP RATIO
1	0.0471	0.7634	0.2030	1.735	1.223
2	0.0254	0.8718	0.1130	1.765	1.202
3	0.0314	0.8500	0.1417	1.715	1.196
4	0.0060	0.9751	0.0258	1.767	1.181
5	0.0131	0.9537	0.0592	1.699	1.171

Table 6. - Listing of Blade Element Performance (continued).
NASA - TASK I (ROTOR 2D)

N.A.S.A. COMPRESSOR OUTPUT DATA													
BLADE ELEMENT PERFORMANCE RESULTS													
POINT NUMBER 16 HEAD NUMBER 16 DATE 4/27/1967													
RADIAL POSITION	REL. INLET FLOW ANG.	INCID. ANG.	INCID. SURF SUCT. ANG.	INLET REL. MACH NO.	INLET REL. VELOCITY	ROTOR SPD. AT INLET	INLET ARS VELOCITY	INLET ABS. MACH NO.	INLET AX. VELOCITY	RADIAL POSITION	REL. EXIT FLOW ANG.	REL. TURN ANG.	REL. TURN ANGLE
1	61.814	3.234	-0.736	1.4113	1515.638	1334.990	717.607	0.668	715.395	1	50.181	0.001	11.633
2	58.880	3.490	-1.260	1.3216	1413.052	1209.643	730.397	0.683	730.285	2	47.391	2.361	11.489
3	56.637	4.367	-1.323	1.2202	1305.167	1088.441	720.249	0.673	716.687	3	43.264	7.094	13.373
4	54.442	4.736	-1.834	1.1059	1184.531	956.108	699.264	0.653	683.342	4	31.493	6.043	22.953
5	55.300	4.780	-2.500	0.9272	1004.778	805.507	600.614	0.554	596.091	5	20.440	14.660	34.940
RADIAL POSITION	REL. EXIT FLOW ANG.	REL. DIFV. ANG. T.E.	REL. TURN ANGLE	EXIT REL. MACH NO.	EXIT REL. VELOCITY	ROTOR SPD. AT EXIT	EXIT ARS VELOCITY	EXIT ARS MACH NO.	EXIT AX. VELOCITY	RADIAL POSITION	REL. EXIT FLOW ANG.	REL. TURN ANGLE	REL. TURN ANGLE
1	50.181	0.001	11.633	0.8181	976.831	1320.329	847.478	0.710	624.897	1	50.181	0.001	11.633
2	47.391	2.361	11.489	0.7644	900.203	1210.334	819.456	0.696	609.419	2	47.391	2.361	11.489
3	43.264	7.094	13.373	0.5248	737.937	1101.797	803.054	0.680	536.980	3	43.264	7.094	13.373
4	31.493	6.043	22.953	0.6483	751.301	991.801	879.685	0.759	637.156	4	31.493	6.043	22.953
5	20.440	14.660	34.940	0.5965	685.061	883.955	915.359	0.707	626.506	5	20.440	14.660	34.940
RADIAL POSITION	DIFFUSION FACTOR	ST. PRESS. RISE COEFF	CH1	INLET ABS. TANG. VEL	EXIT ARS TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	RADIAL POSITION	DIFFUSION FACTOR	ST. PRESS. RISE COEFF	CH1
1	0.493	0.34570	0.4627	0.	570.801	1334.990	847.478	0.873	624.897	1	0.493	0.34570	0.4627
2	0.493	0.43495	0.5259	0.	547.804	1209.643	819.456	0.834	609.419	2	0.493	0.43495	0.5259
3	0.574	0.50363	0.5654	0.	506.414	1088.441	803.054	0.749	536.980	3	0.574	0.50363	0.5654
4	0.505	0.55994	0.5746	0.	601.462	956.108	879.685	0.932	637.156	4	0.505	0.55994	0.5746
5	0.477	0.54339	0.4601	0.	650.457	805.507	915.359	1.127	626.506	5	0.477	0.54339	0.4601
RADIAL POSITION	ADAPTIC EFFICIENCY	POLYTROPIC EFFICIENCY	TOT. PRESS. RATIO	TOT. TEMP. RATIO	FIXED INSTRUMENTATION	PRESSURE RATIO	ADAPTIC EFF.	POLYTROPIC EFF.	NOZTLF WEIGHT FLOW	NOZTLF WEIGHT FLOW	NOZTLF WEIGHT FLOW	NOZTLF WEIGHT FLOW	NOZTLF WEIGHT FLOW
1	0.7565	0.7782	1.838	1.251	1.218	1.222	1.204	1.194	1.7820	1.7820	1.7820	1.7820	1.7820
2	0.8616	0.8729	1.827	1.218	1.218	1.222	1.204	1.194	0.8715	0.8715	0.8715	0.8715	0.8715
3	0.7901	0.8061	1.761	1.222	1.222	1.222	1.204	1.194	0.8816	0.8816	0.8816	0.8816	0.8816
4	0.9059	0.9135	1.809	1.204	1.204	1.204	1.204	1.204	0.8816	0.8816	0.8816	0.8816	0.8816
5	0.8795	0.8879	1.731	1.194	1.194	1.194	1.194	1.194	0.8816	0.8816	0.8816	0.8816	0.8816
RADIAL POSITION	TRAVERSE PRESSURE RATIO	ADAPTIC EFF.	POLYTROPIC EFF.	NOZTLF WEIGHT FLOW	NOZTLF WEIGHT FLOW	NOZTLF WEIGHT FLOW	NOZTLF WEIGHT FLOW	NOZTLF WEIGHT FLOW	NOZTLF WEIGHT FLOW	NOZTLF WEIGHT FLOW	NOZTLF WEIGHT FLOW	NOZTLF WEIGHT FLOW	NOZTLF WEIGHT FLOW
1	0.0504	0.7620	0.8831	0.2147	0.2147	0.2147	0.2147	0.2147	0.2147	0.2147	0.2147	0.2147	0.2147
2	0.0243	0.8831	0.1072	0.1072	0.1072	0.1072	0.1072	0.1072	0.1072	0.1072	0.1072	0.1072	0.1072
3	0.0300	0.8608	0.1362	0.1362	0.1362	0.1362	0.1362	0.1362	0.1362	0.1362	0.1362	0.1362	0.1362
4	0.0064	0.9740	0.0276	0.0276	0.0276	0.0276	0.0276	0.0276	0.0276	0.0276	0.0276	0.0276	0.0276
5	0.0223	0.9231	0.1018	0.1018	0.1018	0.1018	0.1018	0.1018	0.1018	0.1018	0.1018	0.1018	0.1018

PARAMETERS DETERMINED FROM FIXED INSTRUMENTATION

RADIAL POSITION	TOT. PRESS. LOSS PARAM	ADAPTIC EFFICIENCY	LOSS COEFFICIENT	TOT. PRESS. RATIO	TOT. TEMP. RATIO
1	0.0504	0.7620	0.2147	1.789	1.237
2	0.0243	0.8831	0.1072	1.820	1.211
3	0.0300	0.8608	0.1362	1.765	1.205
4	0.0064	0.9740	0.0276	1.800	1.188
5	0.0223	0.9231	0.1018	1.716	1.181

Table 6. - Listing of Blade Element Performance (continued).
NASA - TASK I (ROTOR 2D)

N.A.S.A. COMPRESSOR OUTPUT DATA														
BLADE ELEMENT PERFORMANCE RESULTS														
POINT NUMBER 17 HEADING NUMBER 17 DATE 4/27/1967														
RADIAL POSITION	REL. INLET FLOW ANG.	INCID. ANG.	INCID. ANG. MN. CORR. LN.	SUCT. SURF	INLET REL. MACH NO.	INLET REL. VELOCITY	ROTOR SPD. AT INLET	INLET ABS. MACH NO.	INLET ABS. VELOCITY	EXIT ABS. MACH NO.	EXIT ABS. VELOCITY	AXIAL VEL. RATIO	INLET AX. VELOCITY	EXIT AX. VELOCITY
1	61.735	2.055	-1.094	-0.515	1.4127	1515.012	1333.451	0.671	719.144	0.683	730.278	0.683	730.167	716.927
2	56.855	3.465	-1.285	-1.3205	1.411.797	1208.249	1087.186	0.666	685.558	0.666	685.558	0.666	685.558	685.558
3	56.898	4.648	-1.062	-1.330	1.0969	1175.596	804.579	0.548	593.345	0.548	593.345	0.548	593.345	593.345
4	54.950	5.240	-1.330	-1.330	0.9231	909.703	804.579	0.548	593.345	0.548	593.345	0.548	593.345	593.345
5	56.675	5.075	-2.205	-2.205	0.9231	909.703	804.579	0.548	593.345	0.548	593.345	0.548	593.345	593.345
RADIAL POSITION	REL. EXIT FLOW ANG.	REL. TURN ANGLE	REL. DEV. ANG. I.E.	REL. TURN ANGLE	EXIT REL. MACH NO.	EXIT REL. VELOCITY	ROTOR SPD. AT EXIT	EXIT ABS. MACH NO.	EXIT ABS. VELOCITY	AXIAL VEL. RATIO	INLET AX. VELOCITY	EXIT AX. VELOCITY	INLET AX. VELOCITY	EXIT AX. VELOCITY
1	46.086	12.650	-1.094	12.650	0.7835	939.230	1318.807	0.723	866.761	0.723	866.761	0.723	866.761	866.761
2	44.887	11.968	1.857	11.968	0.7515	885.938	1208.939	0.701	826.261	0.701	826.261	0.701	826.261	826.261
3	42.416	14.482	6.246	14.482	0.6202	731.423	1100.527	0.689	683.051	0.689	683.051	0.689	683.051	683.051
4	30.943	7.497	7.497	24.006	0.6367	737.182	900.658	0.762	882.012	0.762	882.012	0.762	882.012	882.012
5	26.577	14.797	0.487	35.096	0.5848	671.934	882.936	0.790	907.768	0.790	907.768	0.790	907.768	907.768
RADIAL POSITION	PISTON FACTOR	ST. PRESS. RISE COEFF	CH1	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL
1	0.627	0.35728	0.4751	0.	1333.451	1333.451	1333.451	1333.451	1333.451	1333.451	1333.451	1333.451	1333.451	1333.451
2	0.506	0.44839	0.5390	0.	562.209	562.209	562.209	562.209	562.209	562.209	562.209	562.209	562.209	562.209
3	0.580	0.50994	0.5706	0.	607.542	607.542	607.542	607.542	607.542	607.542	607.542	607.542	607.542	607.542
4	0.516	0.56213	0.5752	0.	613.689	613.689	613.689	613.689	613.689	613.689	613.689	613.689	613.689	613.689
5	0.487	0.56499	0.4795	0.	652.439	652.439	652.439	652.439	652.439	652.439	652.439	652.439	652.439	652.439
RADIAL POSITION	AUTOMATIC EFFICIENCY	POLYTROPIC EFFICIENCY	TOT. PRESS. RATIO	TOT. TEMP. RATIO	FIXED INSTRUMENTATION PRESSURE RATIO	ADAPTIC EFF.	ADAPTIC EFF.	ADAPTIC EFF.	ADAPTIC EFF.	ADAPTIC EFF.	ADAPTIC EFF.	ADAPTIC EFF.	ADAPTIC EFF.	ADAPTIC EFF.
1	0.7428	0.7641	1.086	1.268	1.086	0.8437	0.8437	0.8437	0.8437	0.8437	0.8437	0.8437	0.8437	0.8437
2	0.6716	0.8823	1.058	1.223	1.058	0.8437	0.8437	0.8437	0.8437	0.8437	0.8437	0.8437	0.8437	0.8437
3	0.6034	0.8164	1.022	1.205	1.022	0.8437	0.8437	0.8437	0.8437	0.8437	0.8437	0.8437	0.8437	0.8437
4	0.6137	0.9207	1.022	1.205	1.022	0.8437	0.8437	0.8437	0.8437	0.8437	0.8437	0.8437	0.8437	0.8437
5	0.6795	0.8626	1.022	1.196	1.022	0.8437	0.8437	0.8437	0.8437	0.8437	0.8437	0.8437	0.8437	0.8437
PARAMETERS DETERMINED FROM FIXED INSTRUMENTATION														
RADIAL POSITION	TOT. PRESS. LOSS PARAM	ADIABATIC EFFICIENCY	LOSS COEFFICIENT	TOT. PRESS. RATIO	TOT. TEMP. RATIO	FIXED INSTRUMENTATION PRESSURE RATIO	ADAPTIC EFF.	ADAPTIC EFF.	ADAPTIC EFF.	ADAPTIC EFF.	ADAPTIC EFF.	ADAPTIC EFF.	ADAPTIC EFF.	ADAPTIC EFF.
1	0.0524	0.7639	0.2182	1.823	1.245	1.086	0.8437	0.8437	0.8437	0.8437	0.8437	0.8437	0.8437	0.8437
2	0.0241	0.8877	0.1052	1.851	1.217	1.058	0.8437	0.8437	0.8437	0.8437	0.8437	0.8437	0.8437	0.8437
3	0.0292	0.8695	0.1304	1.792	1.209	1.022	0.8437	0.8437	0.8437	0.8437	0.8437	0.8437	0.8437	0.8437
4	0.0065	0.9744	0.0278	1.814	1.190	1.022	0.8437	0.8437	0.8437	0.8437	0.8437	0.8437	0.8437	0.8437
5	0.0070	0.9753	0.0321	1.727	1.173	1.022	0.8437	0.8437	0.8437	0.8437	0.8437	0.8437	0.8437	0.8437

Table 6. - Listing of Blade Element Performance (continued).
NASA - TASK I (ROTOR 2D).

N.A.S.A. COMPRESSOR OUTPUT DATA														
BLADE ELEMENT PERFORMANCE RESULTS														
DATE 4/27/1967														
RADIAL POSITION	REL. INLET FLOW ANG.	INCID. ARG. MA. CMR. LN	SUCT. SUPP	INCID. ARG	INLET REL MACH NO.	INLET REL VELOCITY	ROTOR SPD AT INLET	INLET ARS VFLCITY	INLET ARS MACH NO.	INLET ARS VELOCITY	EXIT ARS VFLCITY	EXIT ARS MACH NO.	EXIT ARS VELOCITY	INLET AX. VELOCITY
1	60.620	1.840	-1.930	1.2602	1.379.396	1201.094	678.312	0.630	0.630	678.312	0.630	0.630	678.312	678.312
2	57.880	2.490	-2.260	1.1958	1.285.064	1088.318	683.340	0.636	0.636	683.340	0.636	0.636	683.340	683.340
3	55.609	3.359	-2.351	1.1061	1.188.590	979.272	673.626	0.627	0.627	673.626	0.627	0.627	673.626	673.626
4	53.340	3.630	2.940	1.0044	1.081.297	860.213	655.142	0.609	0.609	655.142	0.609	0.609	655.142	655.142
5	54.037	3.437	-3.843	0.8474	920.739	724.717	567.931	0.523	0.523	567.931	0.523	0.523	567.931	567.931
RADIAL POSITION	REL. EXIT FLOW ANG.	REL. DEFV. ANG. T.E.	REL. TURN ANGLE	EXIT REL. MACH NO.	EXIT REL VELOCITY	ROTOR SPD AT EXIT	EXIT ARS VFLCITY	EXIT ARS MACH NO.	EXIT ARS VELOCITY	EXIT AX. VELOCITY	EXIT ARS MACH NO.	EXIT ARS VELOCITY	EXIT AX. VELOCITY	EXIT AX. VELOCITY
1	53.139	2.059	7.481	1.1046	1225.253	1187.903	765.093	0.690	0.690	765.093	0.690	0.690	765.093	765.093
2	51.258	6.228	6.622	0.9647	1080.104	1088.940	719.507	0.643	0.643	719.507	0.643	0.643	719.507	719.507
3	48.519	12.349	7.090	0.8204	925.549	991.289	682.207	0.605	0.605	682.207	0.605	0.605	682.207	682.207
4	32.256	8.806	21.085	0.6324	925.522	892.326	880.922	0.792	0.792	880.922	0.792	0.792	880.922	880.922
5	15.752	9.972	35.285	0.8445	923.866	795.296	1047.535	0.957	0.957	1047.535	0.957	0.957	1047.535	1047.535
RADIAL POSITION	DIFFUSION FACTOR	ST. PRESS RISE COEFF	CH1	INLET ABS TANG. VEL	EXIT ARS TANG. VEL	EXIT ARS TANG. VEL	EXIT ARS TANG. VEL	EXIT ARS TANG. VEL	EXIT ARS TANG. VEL	EXIT ARS TANG. VEL	EXIT ARS TANG. VEL	EXIT ARS TANG. VEL	EXIT ARS TANG. VEL	EXIT ARS TANG. VEL
1	0.167	0.10936	0.1086	0.	208.450	208.450	1201.094	0.979.453	0.979.453	1201.094	0.979.453	0.979.453	1201.094	1201.094
2	0.224	0.17227	0.2235	0.	246.504	246.504	1088.318	0.989	0.989	1088.318	0.989	0.989	1088.318	1088.318
3	0.298	0.19925	0.2316	0.	298.308	298.308	979.272	0.914	0.914	979.272	0.914	0.914	979.272	979.272
4	0.246	0.22259	0.2180	0.	401.018	401.018	860.213	1.216	1.216	860.213	1.216	1.216	860.213	860.213
5	0.143	-0.00507	-0.1326	0.	550.809	550.809	724.717	1.648	1.648	724.717	1.648	1.648	724.717	724.717
RADIAL POSITION	ADIABATIC EFFICIENCY	POLYTROPIC EFFICIENCY	TOT. PRESS RATIO	TOT. TEMP RATIO	FIXED INSTRUMENTATION PRESSURE RATIO	ADIABATIC EFF. POLYTROPIC EFF.	NOZZLE WEIGHT FLOW	WEIGHT FLOW	WEIGHT FLOW	WEIGHT FLOW	WEIGHT FLOW	WEIGHT FLOW	WEIGHT FLOW	WEIGHT FLOW
1	0.5644	0.7549	1.248	1.076	1.3163	0.8685	215.50	0.99197	0.99197	0.99197	0.99197	0.99197	0.99197	0.99197
2	0.7549	0.7624	1.250	1.088	1.3163	0.8685	215.50	0.99197	0.99197	0.99197	0.99197	0.99197	0.99197	0.99197
3	0.5736	0.5846	1.209	1.097	1.3163	0.8685	215.50	0.99197	0.99197	0.99197	0.99197	0.99197	0.99197	0.99197
4	0.5612	0.8869	1.415	1.119	1.3163	0.8685	215.50	0.99197	0.99197	0.99197	0.99197	0.99197	0.99197	0.99197
5	0.9772	0.8639	1.492	1.138	1.3163	0.8685	215.50	0.99197	0.99197	0.99197	0.99197	0.99197	0.99197	0.99197

PARAMETERS DETERMINED FROM FIXED INSTRUMENTATION

RADIAL POSITION	TOT. PRESS LOSS PARAM	ADIABATIC EFFICIENCY	LOSS COEFFICIENT	TOT. PRESS RATIO	TOT. TEMP RATIO
1	0.0148	0.8306	0.0672	1.251	1.079
2	0.0275	0.7340	0.1312	1.259	1.093
3	0.0378	0.6423	0.1881	1.217	1.090
4	0.0097	0.9425	0.0424	1.407	1.109
5	0.0173	0.9308	0.0769	1.484	1.128

Table 6. - Listing of Blade Element Performance (continued).

NASA TASK I (ROTOR 2D)												
N.A.S.A. COMPRESSOR OUTPUT DATA												
BLADE ELEMENT PERFORMANCE RESULTS												
RADIAL POSITION	REL. INLET FLOW ANG.	INCID. ANG. MN. CMR. LN.	INCID. ANG. SUCT. SURF.	INLET REL. MACH NO.	INLET REL. VELOCITY	ROTOR SPD. AT INLET	INLET ABS. VELOCITY	INLET ABS. MACH NO.	EXIT AX. VELOCITY	INLET ABS. MACH NO.	EXIT ABS. VELOCITY	AXIAL VEL. RATIO
POINT NUMBER 19	HEADING NUMBER 19	DATE	4/27/1967									
1	60.611	1.831	-1.939	1.2798	1379.674	1201.225	678.645	0.630	676.553	0.630	676.553	0.931
2	57.820	2.430	-2.320	1.1962	1286.053	1088.437	685.009	0.637	684.905	0.637	684.905	0.894
3	55.745	3.495	-2.215	1.1034	1146.789	979.380	670.287	0.623	666.972	0.623	666.972	0.843
4	53.687	3.977	-2.593	0.9991	1076.436	860.307	646.983	0.601	632.252	0.601	632.252	0.806
5	54.428	3.828	-3.452	0.8418	915.853	724.796	559.873	0.515	518.370	0.515	518.370	0.816
1	52.746	2.566	7.865	0.9022	1041.841	1188.033	726.805	0.629	700.400	0.629	700.400	0.931
2	49.510	4.480	8.309	0.8220	942.948	1089.059	716.398	0.624	612.258	0.624	612.258	0.894
3	43.793	7.623	11.952	0.6760	779.920	991.397	722.294	0.626	562.583	0.626	562.583	0.843
4	33.029	9.579	20.659	0.6846	777.713	892.423	805.380	0.709	648.605	0.709	648.605	0.806
5	17.959	12.179	36.469	0.6713	754.944	795.383	917.298	0.816	700.400	0.816	700.400	0.931
1	0.340	0.364	0.29120	0.3874	0.0	359.516	1201.225	0.828	0.931	0.828	0.931	0.931
2	0.459	0.459	0.36026	0.4351	0.0	371.938	1088.437	0.894	0.894	0.894	0.894	0.894
3	0.397	0.397	0.44095	0.4488	0.0	452.039	979.380	0.843	0.843	0.843	0.843	0.843
4	0.327	0.327	0.34235	0.2530	0.0	470.751	860.307	0.806	0.806	0.806	0.806	0.806
5	0.8225	0.8225	0.8323	1.494	1.148	568.361	724.796	0.816	1.351	0.816	1.351	0.931
1	0.8972	0.8972	0.9829	1.494	1.136							
2	0.7603	0.7603	0.7729	1.465	1.152							
3	0.9074	0.9074	0.9128	1.527	1.142							
4	0.8937	0.8937	0.9002	1.554	1.151							
5												
1	0.8225	0.8225	0.8323	1.494	1.148							
2	0.8972	0.8972	0.9829	1.494	1.136							
3	0.7603	0.7603	0.7729	1.465	1.152							
4	0.9074	0.9074	0.9128	1.527	1.142							
5	0.8937	0.8937	0.9002	1.554	1.151							
1	0.8225	0.8225	0.8323	1.494	1.148							
2	0.8972	0.8972	0.9829	1.494	1.136							
3	0.7603	0.7603	0.7729	1.465	1.152							
4	0.9074	0.9074	0.9128	1.527	1.142							
5	0.8937	0.8937	0.9002	1.554	1.151							
1	0.8225	0.8225	0.8323	1.494	1.148							
2	0.8972	0.8972	0.9829	1.494	1.136							
3	0.7603	0.7603	0.7729	1.465	1.152							
4	0.9074	0.9074	0.9128	1.527	1.142							
5	0.8937	0.8937	0.9002	1.554	1.151							
1	0.8225	0.8225	0.8323	1.494	1.148							
2	0.8972	0.8972	0.9829	1.494	1.136							
3	0.7603	0.7603	0.7729	1.465	1.152							
4	0.9074	0.9074	0.9128	1.527	1.142							
5	0.8937	0.8937	0.9002	1.554	1.151							
1	0.8225	0.8225	0.8323	1.494	1.148							
2	0.8972	0.8972	0.9829	1.494	1.136							
3	0.7603	0.7603	0.7729	1.465	1.152							
4	0.9074	0.9074	0.9128	1.527	1.142							
5	0.8937	0.8937	0.9002	1.554	1.151							
1	0.8225	0.8225	0.8323	1.494	1.148							
2	0.8972	0.8972	0.9829	1.494	1.136							
3	0.7603	0.7603	0.7729	1.465	1.152							
4	0.9074	0.9074	0.9128	1.527	1.142							
5	0.8937	0.8937	0.9002	1.554	1.151							
1	0.8225	0.8225	0.8323	1.494	1.148							
2	0.8972	0.8972	0.9829	1.494	1.136							
3	0.7603	0.7603	0.7729	1.465	1.152							
4	0.9074	0.9074	0.9128	1.527	1.142							
5	0.8937	0.8937	0.9002	1.554	1.151							
1	0.8225	0.8225	0.8323	1.494	1.148							
2	0.8972	0.8972	0.9829	1.494	1.136							
3	0.7603	0.7603	0.7729	1.465	1.152							
4	0.9074	0.9074	0.9128	1.527	1.142							
5	0.8937	0.8937	0.9002	1.554	1.151							
1	0.8225	0.8225	0.8323	1.494	1.148							
2	0.8972	0.8972	0.9829	1.494	1.136							
3	0.7603	0.7603	0.7729	1.465	1.152							
4	0.9074	0.9074	0.9128	1.527	1.142							
5	0.8937	0.8937	0.9002	1.554	1.151							
1	0.8225	0.8225	0.8323	1.494	1.148							
2	0.8972	0.8972	0.9829	1.494	1.136							
3	0.7603	0.7603	0.7729	1.465	1.152							
4	0.9074	0.9074	0.9128	1.527	1.142							
5	0.8937	0.8937	0.9002	1.554	1.151							
1	0.8225	0.8225	0.8323	1.494	1.148							
2	0.8972	0.8972	0.9829	1.494	1.136							
3	0.7603	0.7603	0.7729	1.465	1.152							
4	0.9074	0.9074	0.9128	1.527	1.142							
5	0.8937	0.8937	0.9002	1.554	1.151							
1	0.8225	0.8225	0.8323	1.494	1.148							
2	0.8972	0.8972	0.9829	1.494	1.136							
3	0.7603	0.7603	0.7729	1.465	1.152							
4	0.9074	0.9074	0.9128	1.527	1.142							
5	0.8937	0.8937	0.9002	1.554	1.151							
1	0.8225	0.8225	0.8323	1.494	1.148							
2	0.8972	0.8972	0.9829	1.494	1.136							
3	0.7603	0.7603	0.7729	1.465	1.152							
4	0.9074	0.9074	0.9128	1.527	1.142							
5	0.8937	0.8937	0.9002	1.554	1.151							
1	0.8225	0.8225	0.8323	1.494	1.148							
2	0.8972	0.8972	0.9829	1.494	1.136							
3	0.7603	0.7603	0.7729	1.465	1.152							
4	0.9074	0.9074	0.9128	1.527	1.142							
5	0.8937	0.8937	0.9002	1.554	1.151							
1	0.8225	0.8225	0.8323	1.494	1.148							
2	0.8972	0.8972	0.9829	1.494	1.136							
3	0.7603	0.7603	0.7729	1.465	1.152							
4	0.9074	0.9074	0.9128	1.527	1.142							
5	0.8937	0.8937	0.9002	1.554	1.151							
1	0.8225	0.8225	0.8323	1.494	1.148							
2	0.8972	0.8972	0.9829	1.494	1.136							
3	0.7603	0.7603	0.7729	1.465	1.152							
4	0.9074	0.9074	0.9128	1.527	1.142							
5	0.8937	0.8937	0.9002	1.554	1.151							
1	0.8225	0.8225	0.8323	1.494	1.148							
2	0.8972	0.8972	0.9829	1.494	1.136							
3	0.7603	0.7603	0.7729	1.465	1.152							
4	0.9074	0.9074	0.9128	1.527	1.142							
5	0.8937	0.8937	0.9002	1.554	1.151							
1	0.8225	0.8225	0.8323	1.494	1.148							
2	0.8972	0.8972	0.9829	1.494	1.136							
3	0.7603	0.7603	0.7729	1.465	1.152							
4	0.9074	0.9074	0.9128	1.527	1.142							
5	0.8937	0.8937	0.9002	1.554	1.151							
1	0.8225	0.8225	0.8323	1.494	1.148							
2	0.8972	0.8972	0.9829	1.494	1.136							
3	0.7603	0.7603	0.7729	1.465	1.152							
4	0.9074	0.9074	0.9128	1.527	1.142							
5	0.8937	0.8937	0.9002	1.554	1.151							
1	0.8225	0.8225	0.8323	1.494	1.148							
2	0.8972	0.8972	0.9829	1.494	1.136							
3	0.7603	0.7603	0.7729	1.465	1.152							

Table 6. - Listing of Blade Element Performance (continued).

NASA - TASK 1 (ROTOR 2D)														
N.A.S.A. COMPRESSOR OUTPUT DATA														
BLADE ELEMENT PERFORMANCE RESULTS														
POINT NUMBER 20 HEADING NUMBER 20 DATE 4/27/1967														
RADIAL POSITION	REL. INLET FLOW ANG.	INCID. ANG.	INLET REL. MACH NO.	INLET REL. VELOCITY	ROTOR SPD. AT INLET	INLET ABS. VELOCITY	INLET ABS. MACH NO.	INLET AX. VELOCITY						
1	60.792	-1.752	1.2763	1377.225	1201.297	673.524	0.624	671.448						
2	58.054	-2.085	1.1929	1282.845	1088.502	678.842	0.631	678.759						
3	55.662	-2.298	1.1050	1188.029	979.438	672.305	0.625	669.071						
4	53.443	-2.832	1.0028	1079.929	860.358	652.710	0.606	637.848						
5	51.995	-3.882	0.8450	921.433	724.839	568.900	0.524	526.728						
RADIAL POSITION	REL. EXIT FLOW ANG.	REL. TURN ANG.	EXIT REL. MACH NO.	EXIT REL. VELOCITY	ROTOR SPD. AT EXIT	EXIT ABS. VELOCITY	EXIT ABS. MACH NO.	EXIT AX. VELOCITY						
1	51.409	9.329	0.8659	1007.284	1188.104	745.390	0.641	626.881						
2	48.275	9.779	0.7867	906.968	1089.124	730.978	0.634	603.632						
3	45.446	13.166	0.6603	763.922	991.457	737.576	0.638	582.835						
4	42.277	21.170	0.6525	744.654	892.477	803.128	0.704	626.219						
5	39.072	34.922	0.6259	707.928	795.431	880.259	0.778	652.727						
RADIAL POSITION	DIFFUSION FACTOR	ST. PRESS. RISE COEFF	CHI	INLET ABS. TANG. VEL	EXIT ABS. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	AXIAL VFL. RATIO						
1	0.375	0.32079	0.4196	0.	400.881	1201.297	787.223	0.934						
2	0.401	0.39364	0.4694	0.	412.225	1088.502	676.899	0.889						
3	0.479	0.44803	0.4988	0.	475.779	979.438	515.678	0.841						
4	0.437	0.49375	0.5020	0.	496.942	860.358	395.534	0.982						
5	0.393	0.44001	0.3553	0.	569.756	724.839	225.675	1.239						
RADIAL POSITION	ADIABATIC EFFICIENCY	POLYTROPIC EFFICIENCY	TOT. PRESS. RATIO	TOT. TEMP. RATIO	FIXED INSTRUMENTATION PRESSURE RATIO	ABS. INLET FLOW ANG.	ABS. EXIT FLOW ANG.							
1	0.9245	0.8352	1.562	1.165	= 1.5560	0.	32.598							
2	0.8940	0.9004	1.556	1.151	ADIABATIC EFF. = 0.8996	0.	34.330							
3	0.7990	0.8107	1.530	1.162	POLYTROPIC EFF. = 0.9056	0.	40.209							
4	0.9136	0.9139	1.568	1.151	NOZZLE WEIGHT FLOW = 214.88	0.	38.434							
5	0.8973	0.9036	1.565	1.153	L.E. CHECK WEIGHT FLOW/NOZ. WEIGHT FLOW = 0.99209	0.	41.117							
						T.E. CHECK WEIGHT FLOW/NOZ. WEIGHT FLOW = 0.99548								
						PERCENT DESIGN SPEED = 90								

PARAMETERS DETERMINED FROM FIXED INSTRUMENTATION

RADIAL POSITION	TOT. PRESS. LOSS PARAM	ADIABATIC EFFICIENCY	LOSS COEFFICIENT	TOT. PRESS. RATIO	TOT. TEMP. RATIO
1	0.0297	0.8255	0.1300	1.553	1.162
2	0.0158	0.9077	0.0708	1.560	1.149
3	0.0233	0.8763	0.1043	1.538	1.149
4	0.0044	0.9795	0.0190	1.565	1.139
5	0.0187	0.9321	0.0845	1.564	1.146

Table 6. - Listing of Blade Element Performance (continued).

NASA - TASK 1 (ROTOR 2D)											
N.A.S.A. COMPRESSOR OUTPUT DATA											
BLADE ELEMENT PERFORMANCE RESULTS											
POINT NUMBER	1	READING NUMBER	21	DATE	4/28/1967						
RADIAL POSITION	REL. INLET FLOW ANG.	INCID ANG MN. CHMR. LN	SUCT. SURF	INLET REL MACH NO.	INLET REL VELOCITY	ROTOR SPD AT INLET	INLET ABS VELOCITY	INLET ABS MACH NO.	INLET ABS VELOCITY	INLET AX. VELOCITY	INLET AX. VELOCITY
1	60.049	1.269	-2.501	0.6969	771.280	667.761	385.963	0.349	384.773	384.773	384.773
2	56.855	1.465	-3.285	0.6536	722.680	605.063	395.178	0.357	395.118	395.118	395.118
3	54.183	1.933	-3.777	0.6091	672.550	544.438	394.856	0.358	392.904	392.904	392.904
4	51.428	1.718	-4.852	0.5588	617.283	478.245	390.261	0.353	381.395	381.395	381.395
5	51.800	1.200	-6.080	0.4775	528.782	402.914	342.448	0.309	347.062	347.062	347.062
RADIAL POSITION	REL. EXIT FLOW ANG.	REL. DEV. ANG. T.E.	REL. TURN ANGLE	EXIT REL. MACH NO.	EXIT REL. VELOCITY	ROTOR SPD AT EXIT	EXIT ABS VELOCITY	EXIT ABS MACH NO.	EXIT ABS VELOCITY	EXIT AX. VELOCITY	EXIT AX. VELOCITY
1	52.707	2.527	7.342	0.6085	680.158	660.428	429.773	0.385	411.729	411.729	411.729
2	48.158	3.128	8.697	0.5535	618.339	605.408	437.153	0.391	412.473	412.473	412.473
3	41.691	5.521	12.493	0.4921	550.340	551.118	451.061	0.403	410.650	410.650	410.650
4	29.599	6.149	21.829	0.4717	526.027	496.099	516.222	0.463	434.799	434.799	434.799
5	14.113	8.333	37.687	0.4695	521.586	442.154	598.385	0.539	482.859	482.859	482.859
RADIAL POSITION	DIFFUSION FACTOR	ST. PRESS RISE COEFF	CH1	INLET ABS TANG. VEL	EXIT ABS TANG. VEL	INLET REL TANG. VEL	EXIT REL TANG. VEL	INLET ABS TANG. VEL	EXIT ABS TANG. VEL	INLET AX. VFL. RATIO	EXIT AX. VFL. RATIO
1	0.175	0.16138	0.1944	0.	119.813	667.761	605.063	540.615	460.647	1.070	1.044
2	0.211	0.22378	0.2416	0.	144.761	185.343	544.438	365.755	258.349	1.045	1.045
3	0.266	0.26940	0.2714	0.	237.750	318.233	478.245	123.921	123.921	1.192	1.192
4	0.253	0.27930	0.2493	0.						1.554	1.554
5	0.161	0.10191	-0.0114	0.							
RADIAL POSITION	ADIABATIC EFFICIENCY	POLYTROPIC EFFICIENCY	TOT. PRESS RATIO	TOT. TEMP RATIO	FIXED INSTRUMENTATION PRESSURE RATIO	ADIABATIC EFF.	POLYTROPIC EFF.	NOZZLE WEIGHT FLOW	NOZZLE WEIGHT FLOW	NOZZLE WEIGHT FLOW	NOZZLE WEIGHT FLOW
1	0.8938	0.8950	1.081	1.025	1.1150	0.9341	0.9352	144.32	144.32	144.32	144.32
2	0.9909	0.9910	1.093	1.026							
3	0.8639	0.8658	1.103	1.033							
4	0.9769	0.9773	1.133	1.037							
5	0.9639	0.9647	1.160	1.045							
PARAMETERS DETERMINED FROM FIXED INSTRUMENTATION											
RADIAL POSITION	TOT. PRESS LOSS PARAM	ADIABATIC EFFICIENCY	LOSS COEFFICIENT	TOT. PRESS RATIO	TOT. TEMP RATIO						
1	0.0110	0.8518	0.0494	1.084	1.027						
2	0.0096	0.8946	0.0432	1.098	1.030						
3	0.0128	0.8892	0.0567	1.108	1.034						
4	0.0028	0.9823	0.0118	1.135	1.037						
5	-0.0018	1.0078	-0.0079	1.159	1.043						

Table 6. - Listing of Blade Element Performance (continued).

NASA - TASK 1 (ROTOR 2D)												
N.A.S.A. COMPRESSOR OUTPUT DATA												
BLADE ELEMENT PERFORMANCE RESULTS												
RADIAL POSITION	REL. INLET FLOW ANG.	INCID ANG MN, CHBR. LN	INCID ANG SUCT. SURF	INLET REL MACH NO.	INLET REL VELOCITY	ROTOR SPD AT INLET	INLET ABS VELOCITY	INLET ABS MACH NO.	EXIT AX. VELOCITY	INLET ABS MACH NO.	EXIT ABS VELOCITY	AXIAL VFL. RATIO
1	61.106	2.326	-1.444	0.6881	741.905	666.577	349.019	0.333	367.881	0.333	367.881	1.077
2	57.985	2.595	-2.155	0.6444	712.357	603.989	377.691	0.342	377.633	0.342	377.633	1.047
3	55.521	3.271	-2.439	0.5978	660.337	543.471	375.078	0.340	373.223	0.340	373.223	1.043
4	52.916	3.206	-3.364	0.5465	603.530	477.396	369.243	0.334	360.836	0.334	360.836	1.181
5	53.462	2.862	-4.418	0.4653	515.147	402.200	321.889	0.291	298.027	0.291	298.027	1.547
RADIAL POSITION	REL. EXIT FLOW ANG.	REL. DEV. ANG. T.E.	REL. TURN ANGLE	EXIT REL. MACH NO.	EXIT REL. VELOCITY	ROTOR SPD AT EXIT	EXIT ABS VELOCITY	EXIT ABS MACH NO.	EXIT AX. VELOCITY	EXIT ABS MACH NO.	EXIT ABS VELOCITY	AXIAL VFL. RATIO
1	52.417	2.237	8.689	0.5802	650.035	659.256	422.579	0.377	386.105	0.377	386.105	1.077
2	47.976	2.946	10.009	0.5276	590.639	604.334	428.675	0.383	395.391	0.383	395.391	1.047
3	41.568	5.398	13.953	0.4648	520.702	550.140	440.389	0.393	389.275	0.393	389.275	1.043
4	29.663	6.213	23.254	0.4415	493.178	495.218	498.089	0.446	426.130	0.446	426.130	1.181
5	14.649	8.869	38.813	0.4397	488.994	441.369	572.317	0.515	461.011	0.515	461.011	1.547
RADIAL POSITION	DIFFUSION FACTOR	ST. PRESS RISE COEFF	CH1	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	AXIAL VFL. RATIO
1	0.216	0.21139	0.2479	0.	144.591	666.577	514.665	0.	514.665	0.	514.665	1.077
2	0.249	0.27267	0.2923	0.	165.577	603.989	438.758	0.	438.758	0.	438.758	1.047
3	0.306	0.31604	0.3184	0.	204.917	543.471	345.223	0.	345.223	0.	345.223	1.043
4	0.298	0.33015	0.2989	0.	252.524	477.396	242.694	0.	242.694	0.	242.694	1.181
5	0.203	0.17062	0.0538	0.	320.864	402.200	120.505	0.	120.505	0.	120.505	1.547
RADIAL POSITION	ADIABATIC EFFICIENCY	POLYTROPIC EFFICIENCY	TOT. PRESS RATIO	TOT. TEMP RATIO	ARS. INLET FLOW ANG.	ARS. EXIT FLOW ANG.	ABS. EXIT FLOW ANG.	ABS. EXIT FLOW ANG.	ABS. EXIT FLOW ANG.	ABS. EXIT FLOW ANG.	ABS. EXIT FLOW ANG.	ABS. EXIT FLOW ANG.
1	0.9280	0.9291	1.102	1.030	0.	0.	20.054	20.054	20.054	20.054	20.054	20.054
2	0.9617	0.9623	1.110	1.032	0.	0.	22.722	22.722	22.722	22.722	22.722	22.722
3	0.8734	0.8754	1.116	1.037	0.	0.	27.763	27.763	27.763	27.763	27.763	27.763
4	0.9349	0.9362	1.140	1.045	0.	0.	30.651	30.651	30.651	30.651	30.651	30.651
5	0.9695	0.9702	1.161	1.045	0.	0.	34.838	34.838	34.838	34.838	34.838	34.838
RADIAL POSITION	TRAVERSE PRESSURE RATIO	ADIABATIC EFF.	POLYTROPIC EFF.	NOZZLE WEIGHT FLOW	NOZZLE WEIGHT FLOW	NOZZLE WEIGHT FLOW	NOZZLE WEIGHT FLOW	NOZZLE WEIGHT FLOW	NOZZLE WEIGHT FLOW	NOZZLE WEIGHT FLOW	NOZZLE WEIGHT FLOW	NOZZLE WEIGHT FLOW
1	= 1.1240	= 0.9358	= 0.9369	= 1.1240	= 0.9504	= 0.9512	= 0.9512	= 0.9512	= 0.9512	= 0.9512	= 0.9512	= 0.9512
2	= 0.9358	= 0.9369	= 0.9369	= 0.9369	= 0.9369	= 0.9369	= 0.9369	= 0.9369	= 0.9369	= 0.9369	= 0.9369	= 0.9369
3	= 0.9369	= 0.9369	= 0.9369	= 0.9369	= 0.9369	= 0.9369	= 0.9369	= 0.9369	= 0.9369	= 0.9369	= 0.9369	= 0.9369
4	= 0.9369	= 0.9369	= 0.9369	= 0.9369	= 0.9369	= 0.9369	= 0.9369	= 0.9369	= 0.9369	= 0.9369	= 0.9369	= 0.9369
5	= 0.9369	= 0.9369	= 0.9369	= 0.9369	= 0.9369	= 0.9369	= 0.9369	= 0.9369	= 0.9369	= 0.9369	= 0.9369	= 0.9369

PARAMETERS DETERMINED FROM FIXED INSTRUMENTATION

RADIAL POSITION	TOT. PRESS LOSS PARAM	ADIABATIC EFFICIENCY	LOSS COEFFICIENT	TOT. PRESS RATIO	TOT. TEMP RATIO
1	0.0121	0.8646	0.0541	1.101	1.032
2	0.0069	0.9328	0.0307	1.112	1.033
3	0.0108	0.9151	0.0474	1.118	1.036
4	-0.0000	1.0005	-0.0004	1.140	1.038
5	-0.0040	1.0167	-0.0175	1.158	1.042

Table 6. - Listing of Blade Element Performance (continued).

NASA - TASK I (ROTOR 2D)

N.A.S.A. COMPRESSOR OUTPUT DATA

BLADE ELEMENT PERFORMANCE RESULTS

POINT NUMBER 3 READING NUMBER 23 DATE 4/28/1967

RADIAL POSITION	REL. INLET FLOW ANG.	INCID ANG MN, CMR, LN	INCID SURF SUCT. SURF	INLET REL MACH NO.	INLET REL VELOCITY	ROTOR SPD AT INLET	INLET ARS VELOCITY	INLET ARS MACH NO.	INLET AX. VELOCITY
1	63.027	4.247	0.477	0.6748	749.360	667.418	340.725	0.307	339.675
2	60.000	4.610	-0.140	0.6301	698.335	604.752	349.209	0.315	349.156
3	57.547	5.297	-0.413	0.5828	645.789	544.158	347.758	0.314	346.039
4	55.163	5.453	-1.117	0.5295	586.835	477.999	346.479	0.307	332.678
5	55.400	4.800	-2.480	0.4522	502.197	402.708	300.047	0.270	277.605
RADIAL POSITION	REL. EXIT FLOW ANG.	REL. DEV. ANG. T.E.	REL. TURN ANGLE	EXIT REL. MACH NO.	EXIT REL. VELOCITY	ROTOR SPD AT EXIT	EXIT ARS VELOCITY	EXIT ARS MACH NO.	EXIT AX. VELOCITY
1	52.094	1.914	10.933	0.5354	603.615	660.089	414.602	0.368	370.500
2	47.683	2.653	12.317	0.4864	547.243	605.097	419.435	0.373	368.418
3	41.896	5.726	15.651	0.4264	479.863	550.835	425.360	0.378	354.917
4	29.948	6.498	25.214	0.4047	454.054	495.844	478.015	0.426	391.218
5	14.929	9.149	40.471	0.3917	437.972	441.927	538.453	0.482	412.403
RADIAL POSITION	DIFFUSION FACTOR	ST. PRESS RISE COEFF	CH1	INLET ARS TANG. VEL	EXIT ARS TANG. VEL	EXIT ARS TANG. VEL	INLET RFL TANG. VEL	EXIT RFL TANG. VEL	AXIAL VEL. RATIO
1	0.284	0.26821	0.3077	0.	184.264	184.264	667.418	475.825	1.091
2	0.312	0.33359	0.3545	0.	200.459	200.459	604.752	404.639	1.055
3	0.366	0.38114	0.3833	0.	230.634	230.634	544.158	320.201	1.031
4	0.353	0.40665	0.3728	0.	270.443	270.443	477.999	225.401	1.176
5	0.290	0.30197	0.1814	0.	331.969	331.969	402.708	109.958	1.485
RADIAL POSITION	ADIABATIC EFFICIENCY	POLYTROPIC EFFICIENCY	TOT. PRESS RATIO	TOT. TEMP RATIO	ARS. INLET FLOW ANG.	ARS. EXIT FLOW ANG.	FIXED INSTRUMENTATION PRESSURE RATIO	ADIABATIC EFF.	POLYTROPIC EFF.
1	0.8876	0.8896	1.127	1.039	0.	26.443	= 1.1400	=	=
2	0.9436	0.9446	1.133	1.039	0.	28.551	= 0.9445	=	=
3	0.9003	0.9021	1.133	1.040	0.	32.870	= 0.9456	=	=
4	0.9662	0.9669	1.152	1.043	0.	34.655	= 127.22	=	=
5	0.9717	0.9723	1.165	1.046	0.	38.833	= 0.98487	=	=
TRAVERSE PRESSURE RATIO = 1.1406									
TRAVERSE ADIABATIC EFF. = 0.9333									
TRAVERSE POLYTROPIC EFF. = 0.9346									
FLOW COEFFICIENT L.E. = 0.980									
FLOW COEFFICIENT T.E. = 0.950									
PERCENT DESIGN SPEED = 50									
L.E. CHECK WEIGHT FLOW/NOZ. WEIGHT FLOW = 0.98487									
T.E. CHECK WEIGHT FLOW/NOZ. WEIGHT FLOW = 0.96605									

PARAMETERS DETERMINED FROM FIXED INSTRUMENTATION

RADIAL POSITION	TOT. PRESS LOSS PARAM	ADIABATIC EFFICIENCY	LOSS COEFFICIENT	TOT. PRESS RATIO	TOT. TEMP RATIO
1	0.0135	0.8798	0.0597	1.126	1.039
2	0.0086	0.9314	0.0381	1.132	1.039
3	0.0110	0.9251	0.0489	1.135	1.040
4	0.0019	0.9900	0.0080	1.150	1.041
5	0.0023	0.9912	0.0102	1.162	1.044

Table 6. - Listing of Blade Element Performance (continued).

NASA - TASK I (ROTOR 2D)

N.A.S.A. COMPRESSOR OUTPUT DATA
BLADE ELEMENT PERFORMANCE RESULTS

POINT NUMBER 4 READING NUMBER 24 DATE 4/28/1967

RADIAL POSITION	REL. INLET FLOW ANG.	INCID ANG MN. CHBR. LN	INCID ANG SUCT. SURF	INLET REL MACH NO.	INLET REL VELOCITY	ROTOR SPD AT INLET	INLET ABS MACH NO.	INLET ABS VELOCITY	INLET AX. VELOCITY
1	63.945	5.165	1.395	0.6695	743.172	667.249	0.295	327.236	326.227
2	60.963	5.573	0.823	0.6238	691.544	604.599	0.303	335.698	335.647
3	58.810	6.560	0.850	0.5747	636.792	544.020	0.299	330.977	329.341
4	56.573	6.863	0.293	0.5205	576.672	477.878	0.291	322.773	315.424
5	57.014	6.414	-0.866	0.4431	491.682	402.605	0.254	282.242	261.319
RADIAL POSITION	REL. EXIT FLOW ANG.	REL. DEV. ANG. T.F.	REL. TURN ANGLE	EXIT REL MACH NO.	EXIT REL VELOCITY	ROTOR SPD AT EXIT	EXIT ABS MACH NO.	EXIT ABS VELOCITY	EXIT AX. VELOCITY
1	52.353	2.173	11.592	0.5142	580.425	659.922	0.361	407.889	354.194
2	48.134	3.104	12.829	0.4639	522.793	604.944	0.364	410.164	348.902
3	42.566	6.396	16.244	0.4079	459.494	550.696	0.368	415.112	338.163
4	30.960	7.510	25.613	0.3780	424.368	495.718	0.409	458.879	361.905
5	15.509	9.729	41.504	0.3718	415.851	441.815	0.467	521.889	390.551
RADIAL POSITION	DIFFUSION FACTOR	ST. PRESS RISE COEFF	CHI	INLET ABS TANG. VEL	EXIT ABS TANG. VEL	INLET RFL TANG. VEL	EXIT RFL TANG. VEL	INLET ABS TANG. ANG.	EXIT ABS TANG. ANG.
1	0.318	0.30450	0.3455	0.	200.764	667.249	459.157	1.086	1.086
2	0.348	0.37239	0.3938	0.	215.623	604.599	389.321	1.039	1.039
3	0.393	0.41917	0.4208	0.	240.104	544.020	310.591	1.027	1.027
4	0.397	0.44543	0.4096	0.	278.604	477.878	217.114	1.147	1.147
5	0.320	0.36019	0.2344	0.	333.438	402.605	108.377	1.495	1.495
TRAVERSE PRESSURE RATIO = 1.1483									
TRAVERSE ADIABATIC EFF. = 0.9260									
TRAVERSE POLYTROPIC EFF. = 0.9275									
FLOW COEFFICIENT I.E. = 0.980									
FLOW COEFFICIENT T.E. = 0.950									
PERCENT DESIGN SPEED = 50									
FIXED INSTRUMENTATION PRESSURE RATIO = 1.1490									
ADIABATIC EFF. = 0.9221									
POLYTROPIC EFF. = 0.9236									
NOZZLE WEIGHT FLOW = 122.02									
L.E. CHECK WEIGHT FLOW/NOZ. WEIGHT FLOW = 0.98498									
T.E. CHECK WEIGHT FLOW/NOZ. WEIGHT FLOW = 0.96234									

PARAMETERS DETERMINED FROM FIXED INSTRUMENTATION

RADIAL POSITION	TOT. PRESS LOSS PARAM.	ADIABATIC EFFICIENCY	LOSS COEFFICIENT	TOT. PRESS RATIO	TOT. TEMP RATIO
1	0.0196	0.8464	0.0875	1.139	1.045
2	0.0126	0.9098	0.0563	1.144	1.043
3	0.0156	0.9035	0.0700	1.144	1.043
4	0.0059	0.9710	0.0253	1.156	1.044
5	0.0039	0.9859	0.0173	1.166	1.046

Table 6. - Listing of Blade Element Performance, (continued).

NASA - TASK 1 (ROTOR 2D)													
N.A.S.A. COMPRESSOR OUTPUT DATA													
BLADE ELEMENT PERFORMANCE RESULTS													
POINT NUMBER		5	READING NUMBER		25	DATE		4/28/1967					
RADIAL POSITION	REL. INLET FLOW ANG.	INCID ANG MN. CMBR. LN	INCID ANG SUCT. SURF	INLET REL MACH NO.	INLET REL VELOCITY	ROTOR SPD AT INLET	INLET ARS VELOCITY	INLET ABS MACH NO.	INLET ABS VELOCITY	AXIAL /REL. RATIO			
1	65.386	6.606	2.836	0.6611	734.755	667.631	306.812	0.276	385.867	1.102			
2	62.427	7.037	2.287	0.6150	682.477	604.945	315.939	0.285	315.891	1.037			
3	60.150	7.900	2.190	0.5663	626.369	544.331	313.930	0.283	312.377	1.015			
4	57.848	8.138	1.568	0.5122	568.522	478.151	307.552	0.277	300.549	1.142			
5	58.257	7.657	0.377	0.4357	484.485	402.836	269.144	0.242	249.211	1.484			
RADIAL POSITION	REL. EXIT FLOW ANG.	REL. DEV. ANG. T.E.	REL. TURN ANGLE	EXIT REL. MACH NO.	EXIT REL. VELOCITY	ROTOR SPD AT EXIT	EXIT ARS VELOCITY	EXIT ARS MACH NO.	EXIT ARS VELOCITY	AXIAL /REL. RATIO			
1	52.612	2.432	12.774	0.4905	555.414	660.299	402.774	0.356	336.951	1.102			
2	48.623	3.593	13.804	0.4391	495.663	605.290	402.254	0.356	327.632	1.037			
3	42.545	6.375	17.605	0.3812	430.506	551.010	410.360	0.363	316.939	1.015			
4	31.645	8.195	26.203	0.3601	405.472	496.002	447.814	0.398	343.314	1.142			
5	15.767	9.987	42.491	0.3514	394.290	442.067	508.489	0.453	369.860	1.484			
RADIAL POSITION	DIFFUSION FACTOR	ST. PRESS RISE COEFF	CH1	INLET ABS TANG. VEL	EXIT ARS TANG. VEL	INLET REL TANG. VEL	EXIT ARS TANG. VEL	ABS. EXIT FLOW ANG.	ARS. INLET FLOW ANG.				
1	0.353	0.33260	0.3745	0.	219.398	667.631	440.901	33.069	0.				
2	0.388	0.40108	0.4223	0.	233.362	604.945	371.928	35.461	0.				
3	0.441	0.45068	0.4515	0.	260.134	544.331	290.877	39.378	0.				
4	0.424	0.48820	0.4504	0.	284.422	478.151	211.580	39.640	0.				
5	0.357	0.42680	0.2970	0.	337.641	402.836	104.427	42.393	0.				
RADIAL POSITION	ADIABATIC EFFICIENCY	POLYTROPIC EFFICIENCY	TOT. PRESS RATIO	TOT. TEMP RATIO	FIXED INSTRUMENTATION	PRESSURE RATIO							
1	0.8570	0.8599	1.153	1.048		= 1.1570							
2	0.9313	0.9327	1.152	1.045		= 0.9253							
3	0.8678	0.8705	1.150	1.047		= 0.9268							
4	0.9392	0.9405	1.159	1.046		= 114.61							
5	0.9693	0.9700	1.171	1.048		= 0.99527							
TRAVERSE PRESSURE RATIO						=	1.1564	ADIABATIC EFF.					
TRAVERSE ADIABATIC EFF.						=	0.9090	POLYTROPIC EFF.					
TRAVERSE POLYTROPIC EFF.						=	0.9109	NOZZLE WEIGHT FLOW					
FLOW COEFFICIENT L.E.						=	0.980	= 114.61					
FLOW COEFFICIENT T.E.						=	0.950	L.F. CHECK WEIGHT FLOW/NOZ. WEIGHT FLOW					
PERCENT DESIGN SPEED						=	50	T.E. CHECK WEIGHT FLOW/NOZ. WEIGHT FLOW					

PARAMETERS DETERMINED FROM FIXED INSTRUMENTATION

RADIAL POSITION	TOT. PRESS LOSS PARAM	ADIABATIC EFFICIENCY	LOSS COEFFICIENT	TOT. PRESS RATIO	TOT. TEMP RATIO
1	0.0237	0.8320	0.1065	1.150	1.049
2	0.0109	0.9262	0.0493	1.154	1.045
3	0.0146	0.9148	0.0655	1.151	1.045
4	0.0036	0.9830	0.0155	1.161	1.044
5	0.0037	0.9873	0.0165	1.171	1.047

Table 6. - Listing of Blade Element Performance (continued).

NASA - TASK 1 (ROTOR 2D)									
N.A.S.A. COMPRESSOR OUTPUT DATA									
BLADE ELEMENT PERFORMANCE RESULTS									
POINT NUMBER	A	READING NUMBER	26	DATE	4/28/1967				
RADIAL POSITION	REL. INLET FLOW ANG.		INCID ANG	SUCT. SURF	INLET REL MACH NO.	INLET REL VELOCITY	ROTOR SPD AT INLET	INLET ABS VELOCITY	INLET ABS MACH NO.
	7.937	4.167	3.656	0.6061	725.999	666.554	287.717	0.259	286.830
	66.717	8.406	3.656	0.6061	673.170	603.969	297.288	0.268	297.243
	63.796	9.409	3.659	0.5569	618.154	543.453	294.574	0.265	293.117
	61.659	10.038	3.468	0.5008	555.937	477.380	284.911	0.257	278.424
RADIAL POSITION	59.748	9.300	2.020	0.4271	474.511	402.186	251.808	0.227	253.141
	59.900								
RADIAL POSITION	REL. EXIT FLOW ANG.	REL. DEV. ANG. T.E.	REL. TURN ANGLE	EXIT REL. MACH NO.	EXIT REL. VELOCITY	ROTOR SPD AT EXIT	EXIT ABS TANG. VEL	EXIT REL TANG. VEL	EXIT ABS MACH NO.
	52.533	2.353	14.184	0.4544	516.684	659.234	401.673	0.353	314.014
	48.715	3.685	15.081	0.4141	468.608	604.313	399.004	0.353	309.186
	42.355	6.185	19.305	0.3508	396.715	550.121	407.640	0.360	292.948
	31.068	7.618	28.680	0.3365	379.005	495.201	442.971	0.393	322.859
RADIAL POSITION	15.243	9.463	44.657	0.3290	368.947	441.354	497.463	0.444	346.921
RADIAL POSITION	DIFFUSION FACTOR	ST. PRESS RISE COEFF	POLYTROPIC EFFICIENCY	TOT. PRESS RATIO	TOT. TEMP RATIO	FIXED INSTRUMENTATION PRESSURE RATIO	ADIA. EFF.	POLYTROPIC EFF.	NOZZLE WEIGHT FLOW
	0.414	0.35448	0.7774	1.163	1.057	1.1440	0.9138	0.9157	109.52
	0.429	0.42324	0.8870	1.161	1.049	0.9138	0.9157	0.9157	109.52
	0.498	0.47184	0.8485	1.157	1.050	0.9138	0.9157	0.9157	109.52
	0.467	0.50901	0.9296	1.164	1.048	0.9138	0.9157	0.9157	109.52
RADIAL POSITION	0.401	0.47167	0.9644	1.174	1.049	0.9138	0.9157	0.9157	109.52
PARAMETERS DETERMINED FROM FIXED INSTRUMENTATION									
RADIAL POSITION	TOT. PRESS LOSS PARAM	ADIABATIC EFFICIENCY	LOSS COEFFICIENT	TOT. PRESS RATIO	TOT. TEMP RATIO	ADIA. EFF.	POLYTROPIC EFF.	NOZZLE WEIGHT FLOW	L.E. CHECK WEIGHT FLOW/NOZ.
	0.0330	0.7929	0.1477	1.160	1.055	0.9138	0.9157	109.52	0.98070
	0.0127	0.9207	0.0573	1.163	1.048	0.9138	0.9157	109.52	0.95827
	0.0165	0.9105	0.0738	1.158	1.047	0.9138	0.9157	109.52	0.95827
	0.0044	0.9804	0.0192	1.166	1.046	0.9138	0.9157	109.52	0.95827
RADIAL POSITION	0.0010	0.9969	0.0043	1.175	1.047	0.9138	0.9157	109.52	0.95827

Table 6. - Listing of Blade Element Performance (continued).

NASA - TASK I (ROTOR 2D)

N.A.S.A. COMPRESSOR OUTPUT DATA

BLADE ELEMENT PERFORMANCE RESULTS

POINT NUMBER 7 READING NUMBER 27 DATE 4/28/1967

RADIAL POSITION	REL. INLET FLOW ANG.	INCID. ANG. MN. CMR. LN	INCID. ANG. SUCT. SURF	INLET REL. MACH NO.	INLET REL. VELOCITY	ROTOR SPD. AT INLET	INLET ABS. VELOCITY	INLET ABS. MACH NO.	INLET AX. VELOCITY
1	59.683	0.903	-2.867	0.9913	1082.570	933.789	547.718	0.502	546.030
2	56.839	1.449	-3.301	0.9267	1010.771	846.112	552.949	0.507	552.865
3	54.281	2.031	-3.679	0.8620	939.324	761.334	550.182	0.505	547.462
4	51.548	1.838	-4.732	0.7907	861.726	668.772	543.431	0.499	531.057
5	51.993	1.393	-5.687	0.6723	737.302	563.430	475.564	0.434	440.310
RADIAL POSITION	REL. EXIT FLOW ANG.	REL. DEV. ANG. T.E.	REL. TURN ANGLE	EXIT REL. MACH NO.	EXIT REL. VELOCITY	ROTOR SPD. AT EXIT	EXIT ABS. VELOCITY	EXIT ABS. MACH NO.	EXIT AX. VELOCITY
1	52.855	2.675	6.828	0.8550	952.039	923.534	599.028	0.538	574.359
2	49.629	4.599	7.210	0.7696	859.129	846.595	588.714	0.527	556.481
3	42.924	6.754	11.357	0.6341	713.428	770.677	595.473	0.529	522.031
4	30.613	7.163	20.935	0.6484	722.399	693.738	703.954	0.632	618.276
5	15.511	9.731	36.482	0.6463	714.602	618.302	814.019	0.736	671.119
RADIAL POSITION	DIFFUSION FACTOR	ST. PRESS. RISE COEFF	CH1	INLET ABS. TANG. VEL	EXIT ABS. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	AXIAL VFL. RATIO	
1	0.176	0.14241	0.1896	0.	165.328	933.789	758.206	1.052	
2	0.214	0.20577	0.2403	0.	192.066	846.112	654.529	1.007	
3	0.333	0.23886	0.2563	0.	285.172	761.334	485.505	0.954	
4	0.266	0.27680	0.2640	0.	327.908	668.772	365.830	1.164	
5	0.174	0.12505	0.0184	0.	432.045	563.430	186.258	1.524	
TRAVERSE PRESSURE RATIO = 1.2090									
TRAVERSE ADIABATIC EFF. = 0.8579									
TRAVERSE POLYTROPIC EFF. = 0.8617									
FLOW COEFFICIENT L.E. = 0.980									
FLOW COEFFICIENT I.E. = 0.950									
PERCENT DESIGN SPEED = 70									

PARAMETERS DETERMINED FROM FIXED INSTRUMENTATION

RADIAL POSITION	TOT. PRESS. LOSS PARAM	ADIABATIC EFFICIENCY	LOSS COEFFICIENT	TOT. PRESS. RATIO	TOT. TEMP. RATIO
1	0.0108	0.8604	0.0489	1.159	1.050
2	0.0122	0.8667	0.0564	1.176	1.055
3	0.0294	0.7602	0.1324	1.185	1.065
4	0.0050	0.9689	0.0216	1.261	1.071
5	0.0006	0.9974	0.0027	1.313	1.081

Table 6. - Listing of Blade Element Performance (continued).

NASA - TASK 1 (ROTOR 2D)													
N.A.S.A. COMPRESSOR OUTPUT DATA													
BLADE ELEMENT PERFORMANCE RESULTS													
POINT NUMBER		8		READING NUMBER		28		DATE		4/27/1967			
RADIAL POSITION	REL. INLET FLOW ANG.	INCID. ANG. MN. CURRLIN	INCID. ANG. SUCT. SURF	INLET REL. MACH NO.	INLET REL. VELOCITY	ROTOR SPD. AT INLET	INLET ABS. VELOCITY	INLET ABS. MACH NO.	INLET AX. VELOCITY	EXIT ABS. MACH NO.	EXIT ABS. VELOCITY	EXIT AX. VELOCITY	AXIAL VFL. RATIO
1	60.697	1.917	-1.853	0.9783	1071.420	933.636	525.609	0.480	523.988				
2	56.123	2.733	-2.017	0.9106	996.259	845.973	526.176	0.481	526.096				
3	54.583	3.633	-2.077	0.8430	920.894	761.210	518.272	0.474	515.710				
4	53.821	4.131	-2.450	0.7634	835.177	668.662	500.412	0.457	489.018				
5	54.334	3.734	-3.546	0.6480	712.758	563.338	436.663	0.397	404.293				
RADIAL POSITION	REL. EXIT FLOW ANG.	REL. DEV. ANG. T.F.	REL. TURN ANGLE	EXIT REL. MACH NO.	EXIT REL. VELOCITY	ROTOR SPD. AT EXIT	EXIT ABS. VELOCITY	EXIT ABS. MACH NO.	EXIT REL. TANG. VEL	EXIT REL. TANG. VEL	INLET REL. TANG. VEL	ABS. EXIT FLOW ANG.	
1	51.718	1.536	8.980	0.7423	841.592	923.383	584.845	0.516	520.911				
2	48.037	3.007	10.086	0.6692	756.302	846.457	580.047	0.513	505.692				
3	41.024	4.154	14.850	0.5927	670.674	770.550	604.701	0.534	505.583				
4	30.074	6.624	23.747	0.5511	619.843	693.624	660.935	0.588	533.397				
5	15.683	9.903	34.651	0.5374	601.112	618.201	740.064	0.662	564.087				
RADIAL POSITION	DIFFUSION FACTOR	ST. PRESS. RISE COEFF	CHI	INLET ABS. TANG. VEL	EXIT ABS. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	AXIAL VFL. RATIO					
1	0.304	0.28501	0.3431	0.	263.380	933.636	562.360	0.994					
2	0.336	0.35232	0.3968	0.	284.096	845.973	562.360	0.961					
3	0.381	0.40115	0.4249	0.	330.678	761.210	439.872	0.980					
4	0.384	0.42373	0.4090	0.	384.751	668.662	308.874	1.091					
5	0.314	0.33614	0.2316	0.	459.828	563.338	158.373	1.395					
RADIAL POSITION	ADIABATIC EFFICIENCY	POLYTROPIC EFFICIENCY	TOT. PRESS. RATIO	TOT. TEMP. RATIO	ABS. INLET FLOW ANG.	ABS. EXIT FLOW ANG.							
1	0.8963	0.8908	1.271	1.079	0.	26.822							
2	0.9405	0.9812	1.278	1.074	0.	29.327							
3	0.8751	0.8795	1.289	1.086	0.	33.187							
4	0.9576	0.9586	1.313	1.085	0.	35.804							
5	0.9524	0.9544	1.336	1.091	0.	39.186							
TRANSVERSE PRESSURE RATIO = 1.2945													
TRANSVERSE ADIABATIC EFF. = 0.9306													
TRANSVERSE POLYTROPIC EFF. = 0.9331													
FLUX COEFFICIENT L.E. = 0.980													
FLUX COEFFICIENT T.E. = 0.950													
PERCENT DESIGN SPEED = 70													
FIXED INSTRUMENTATION													
PRESSURE RATIO = 1.2910													
ADIABATIC EFF. = 0.9471													
POLYTROPIC EFF. = 0.9490													
NOZZLE WEIGHT FLOW = 179.75													
L.E. CHECK WEIGHT FLOW/NOZ. WEIGHT FLOW = 0.98677													
T.E. CHECK WEIGHT FLOW/NOZ. WEIGHT FLOW = 0.96645													

Table 6. - Listing of Blade Element Performance (continued).

NASA TASK I (ROTOR 2D)									
N.A.S.A. COMPRESSOR OUTPUT DATA									
BLADE ELEMENT PERFORMANCE RESULTS									
POINT NUMBER		9		READING NUMBER		29		DATE 4/28/1967	
RADIAL POSITION	REL. INLET FLOW ANG.	INCID ANG MN, CM, BR. LN	SUCT. SURF	INLET REL MACH NO.	INLET REL VELOCITY	ROTOR SPD AT INLET	INLET ARS VELOCITY	INLET ABS MACH NO.	INLET AX. VELOCITY
1	61.682	2.902	-0.868	0.9664	1061.098	933.462	504.557	0.460	503.002
2	59.021	3.631	-1.119	0.9013	966.578	845.816	507.849	0.464	507.792
3	56.766	4.516	-1.194	0.8324	911.253	761.068	501.156	0.458	498.678
4	54.419	4.709	-1.861	0.7564	828.550	668.538	489.441	0.447	478.297
5	55.083	4.483	-2.797	0.6411	705.376	563.233	424.645	0.386	393.166
RADIAL POSITION	REL. EXIT FLOW ANG.	REL. DEV. ANG. T.E.	REL. TURN ANGLE	EXIT REL. MACH NO.	EXIT REL. VELOCITY	ROTOR SPD AT EXIT	EXIT ARS VELOCITY	EXIT ABS MACH NO.	EXIT AX. VELOCITY
1	51.995	1.815	9.687	0.7112	809.567	923.211	575.304	0.505	498.018
2	48.009	2.979	11.013	0.6420	728.547	846.299	574.886	0.507	487.403
3	41.711	5.541	15.055	0.5611	636.761	770.407	548.787	0.519	474.984
4	30.979	7.529	23.440	0.5193	586.405	693.495	639.115	0.566	490.998
5	15.938	10.158	39.145	0.5037	565.240	618.086	717.284	0.639	529.788
RADIAL POSITION	DIFFUSION FACTOR	ST. PRESS. RISE COEFF	CH1	INLET ABS TANG. VEL	EXIT ARS TANG. VEL	INLET REL TANG. VEL	EXIT REL TANG. VEL	AXIAL VEL. RATIO	
1	0.335	0.31819	0.3839	0.	285.901	933.462	637.310	0.990	
2	0.365	0.38754	0.4324	0.	304.818	845.816	541.480	0.960	
3	0.417	0.44263	0.4657	0.	347.046	761.068	423.361	0.952	
4	0.422	0.48289	0.4671	0.	393.321	668.538	300.174	1.045	
5	0.361	0.41211	0.3061	0.	466.789	563.233	151.297	1.347	
RADIAL POSITION	ADIABATIC EFFICIENCY	POLYTROPIC EFFICIENCY	TOT. PRESS. RATIO	TOT. TEMP. RATIO	ABS. INLET FLOW ANG.	ABS. EXIT FLOW ANG.			
1	0.9229	0.9258	1.299	1.084	0.	29.859			
2	0.9431	0.9452	1.305	1.084	0.	32.022			
3	0.9067	0.9102	1.306	1.088	0.	36.154			
4	0.9550	0.9567	1.325	1.088	0.	38.190			
5	0.9473	0.9495	1.344	1.093	0.	41.383			
PARAMETERS DETERMINED FROM FIXED INSTRUMENTATION									
TRAVERSE PRESSURE RATIO = 1.3139									
TRAVERSE ADIABATIC EFF. = 0.9342									
TRAVERSE POLYTROPIC EFF. = 0.9367									
FLOW COEFFICIENT L.E. = 0.980									
FLOW COEFFICIENT T.E. = 0.950									
PERCENT DESIGN SPEED = 70									
NOZ7LE WEIGHT FLOW = 174.55									
L.E. CHECK WEIGHT FLOW/NOZ. WEIGHT FLOW = 0.99037									
T.E. CHECK WEIGHT FLOW/NOZ. WEIGHT FLOW = 0.96148									

PARAMETERS DETERMINED FROM FIXED INSTRUMENTATION

TRAVERSE PRESSURE RATIO = 1.3139
 TRAVERSE ADIABATIC EFF. = 0.9342
 TRAVERSE POLYTROPIC EFF. = 0.9367
 FLOW COEFFICIENT L.E. = 0.980
 FLOW COEFFICIENT T.E. = 0.950
 PERCENT DESIGN SPEED = 70
 PRESSURE RATIO = 1.3130
 ADIABATIC EFF. = 0.9683
 POLYTROPIC EFF. = 0.9695
 NOZTLE WEIGHT FLOW = 174.55
 L.E. CHECK WEIGHT FLOW/NOZ. = 0.99037
 T.E. CHECK WEIGHT FLOW/NOZ. = 0.96148

Table 6. - Listing of Blade Element Performance (continued).

NASA - TASK 1 (ROTOR 2D)

N.A.S.A. COMPRESSOR OUTPUT DATA

BLADE ELEMENT PERFORMANCE RESULTS

POINT NUMBER 10 READING NUMBER 30 DATE 4/28/1967

RADIAL POSITION	REL. INLET FLOW ANG.	INCID ANG MN, CM BR. LN	INCID ANG SUCT. SURF	INLET REL MACH NO.	INLET REL VELOCITY	ROTOR SPD AT INLET	INLET ARS VELOCITY	INLET ARS MACH NO.	INLET AX. VELOCITY
1	61.830	3.050	-0.720	0.9659	1060.551	934.289	501.849	0.457	500.322
2	59.192	3.802	-0.948	0.8997	985.689	846.565	504.888	0.461	504.811
3	57.148	4.898	-0.812	0.8287	908.087	761.742	494.339	0.451	491.895
4	55.289	5.579	-0.991	0.7478	820.186	669.129	474.311	0.432	463.511
5	55.809	5.209	-2.071	0.6345	699.210	563.732	413.644	0.375	382.981
RADIAL POSITION	REL. EXIT FLOW ANG.	REL. DEV. ANG. T.E.	REL. TURN ANGLE	EXIT REL. MACH NO.	EXIT REL. VELOCITY	ROTOR SPD AT EXIT	EXIT ARS VELOCITY	EXIT ARS MACH NO.	EXIT AX. VELOCITY
1	52.112	1.932	9.716	0.7016	800.114	924.028	572.807	0.502	490.912
2	47.640	2.810	11.352	0.6290	714.714	847.048	575.141	0.506	479.707
3	41.601	5.431	15.546	0.5518	627.251	771.089	588.440	0.518	468.689
4	30.613	7.163	24.677	0.5140	580.914	694.109	640.984	0.567	497.184
5	16.103	10.323	39.786	0.4949	560.422	618.633	713.653	0.635	524.860
RADIAL POSITION	DIFFUSION FACTOR	ST. PRESS RISE COEFF	CHI	INLET ABS TANG. VEL	EXIT ARS TANG. VEL	INLET REL TANG. VEL	EXIT REL TANG. VEL	AXIAL VFL. RATIO	
1	0.346	0.32854	0.3949	0.	293.147	914.289	630.881	0.981	
2	0.383	0.39830	0.4433	0.	317.256	846.565	529.793	0.950	
3	0.428	0.44942	0.4721	0.	354.950	761.742	416.139	0.953	
4	0.425	0.47438	0.4568	0.	399.928	669.129	294.181	1.073	
5	0.362	0.41729	0.3083	0.	467.107	563.732	151.526	1.370	
RADIAL POSITION	ADIABATIC EFFICIENCY	POLYTROPIC EFFICIENCY	TOT. PRESS RATIO	TOT. TEMP RATIO	ARS. INLET FLOW ANG.	ABS. EXIT FLOW ANG.			
1	0.9048	0.9064	1.307	1.088	0.	30.843			
2	0.9545	0.9563	1.313	1.085	0.	33.479			
3	0.8949	0.8988	1.311	1.090	0.	37.138			
4	0.9402	0.9426	1.327	1.090	0.	38.813			
5	0.9541	0.9560	1.345	1.093	0.	41.668			
TRAVERSE PRESSURE RATIO = 1.3193									
TRAVERSE ADIABATIC EFF. = 0.9285									
TRAVERSE POLYTROPIC EFF. = 0.9313									
FLOW COEFFICIENT L.E. = 0.980									
FLOW COEFFICIENT T.E. = 0.950									
PERCENT DESIGN SPEED = 70									
FIXED INSTRUMENTATION PRESSURE RATIO = 1.3190									
ADIABATIC EFF. = 0.9494									
POLYTROPIC EFF. = 0.9514									
NOZZLE WEIGHT FLOW = 172.76									
L.E. CHECK WEIGHT FLOW/NOZ. WEIGHT FLOW = 0.98742									
T.E. CHECK WEIGHT FLOW/NOZ. WEIGHT FLOW = 0.96198									

PARAMETERS DETERMINED FROM FIXED INSTRUMENTATION

RADIAL POSITION	TOT. PRESS LOSS PARAM	ADIABATIC EFFICIENCY	LOSS COEFFICIENT	TOT. PRESS RATIO	TOT. TEMP RATIO
1	0.0149	0.8934	0.0662	1.307	1.089
2	0.0078	0.9487	0.0347	1.317	1.086
3	0.0106	0.9389	0.0467	1.312	1.086
4	0.0029	0.9860	0.0125	1.324	1.085
5	0.0038	0.9865	0.0168	1.341	1.089

Table 6. - Listing of Blade Element Performance (continued).

NASA - TASK 1 (ROTOR 2D)

N.A.S.A. COMPRESSOR OUTPUT DATA
BLADE ELEMENT PERFORMANCE RESULTS

POINT NUMBER 11 KEADING NUMBER 31 DATE 4/28/1967

RADIAL POSITION	REL. INLET FLOW ANG.	INCID ANG MN, CHBR. LN	INCID ANG SUCT. SURF	INLET REL MACH NO.	INLET REL VELOCITY	ROTOR SPD AT INLET	INLET ARS VELOCITY	INLET ABS MACH NO.	INLET AX. VELOCITY
1	63.581	4.801	1.031	0.9483	1044.168	934.545	465.739	0.423	464.304
2	60.904	5.514	0.764	0.8826	969.127	846.797	471.319	0.429	471.247
3	58.796	6.546	0.836	0.8122	892.022	761.951	463.826	0.422	461.532
4	56.809	7.099	0.529	0.7332	805.430	669.313	448.038	0.408	437.837
5	57.356	6.756	-0.524	0.6212	685.703	563.887	390.154	0.353	361.232
RADIAL POSITION	REL. EXIT FLOW ANG.	REL. DEV. ANG. T.E.	REL. TURN ANGLE	EXIT REL MACH NO.	EXIT REL VELOCITY	ROTOR SPD AT EXIT	EXIT ARS VELOCITY	EXIT ABS MACH NO.	EXIT AX. VELOCITY
1	51.740	1.560	11.841	0.6483	744.278	924.282	573.524	0.500	460.447
2	47.883	2.853	13.021	0.5868	670.210	847.281	569.772	0.499	449.470
3	42.763	6.593	16.033	0.5036	574.992	771.300	568.974	0.498	421.828
4	31.787	8.337	25.022	0.4682	531.128	694.299	614.609	0.542	449.025
5	16.130	10.350	41.226	0.4548	513.010	618.803	688.587	0.610	480.394
RADIAL POSITION	DIFFUSION FACTOR	ST. PRESS RISE COEFF	CH1	INLET ABS TANG. VEL	EXIT ABS TANG. VEL	INLET REL TANG. VEL	EXIT REL TANG. VEL	AXIAL VEL. RATIO	
1	0.406	0.37152	0.4388	0.	340.414	934.545	583.868	0.992	
2	0.429	0.44323	0.4873	0.	350.146	846.797	497.135	0.954	
3	0.486	0.49449	0.5150	0.	381.187	761.951	390.113	0.914	
4	0.482	0.53850	0.5173	0.	416.029	669.313	278.270	1.026	
5	0.423	0.51493	0.3999	0.	479.871	563.887	138.932	1.330	
RADIAL POSITION	ADIABATIC EFFICIENCY	POLYTROPIC EFFICIENCY	TOT. PRESS RATIO	TOT. TEMP RATIO	ARS, INLET FLOW ANG.	ABS, EXIT FLOW ANG.			
1	0.8863	0.8911	1.354	1.102	0.	36.476			
2	0.9326	0.9383	1.350	1.096	0.	37.919			
3	0.8875	0.8920	1.330	1.096	0.	42.103			
4	0.9398	0.9422	1.341	1.093	0.	42.816			
5	0.9659	0.9674	1.360	1.095	0.	44.989			
TRAVERSE PRESSURE RATIO = 1.3474									
TRAVERSE ADIABATIC EFF. = 0.9191									
TRAVERSE POLYTROPIC EFF. = 0.9225									
FLOW COEFFICIENT L.E. = 0.980									
FLOW COEFFICIENT T.E. = 0.950									
PERCENT DESIGN SPEED = 70									
FIXED INSTRUMENTATION PRESSURE RATIO = 1.3460									
ADIABATIC EFF. = 0.9407									
POLYTROPIC EFF. = 0.9431									
NOZZLE WEIGHT FLOW = 163.61									
L.E. CHECK WEIGHT FLOW/NOZ. WEIGHT FLOW = 0.98868									
T.E. CHECK WEIGHT FLOW/NOZ. WEIGHT FLOW = 0.95533									

PARAMETERS DETERMINED FROM FIXED INSTRUMENTATION

RADIAL POSITION	TOT. PRESS LOSS PARAM	ADIABATIC EFFICIENCY	LOSS COEFFICIENT	TOT. PRESS RATIO	TOT. TEMP RATIO
1	0.0221	0.8664	0.0971	1.350	1.103
2	0.0086	0.9495	0.0382	1.351	1.095
3	0.0128	0.9311	0.0576	1.333	1.092
4	0.0034	0.9850	0.0146	1.343	1.089
5	0.0020	0.9931	0.0091	1.355	1.091

Table 6. - Listing of Blade Element Performance (continued).

NASA - TASK I (ROTOR 2D)													
N.A.S.A. COMPRESSOR OUTPUT DATA													
BLADE ELEMENT PERFORMANCE RESULTS													
RADIAL POSITION	INLET ANG.	INCID ANG.	INCID ANG.	INLET REL.	INLET REL.	INLET REL.	INLET REL.	INLET REL.	INLET REL.	INLET REL.	INLET REL.	INLET REL.	INLET REL.
	FLOW ANG.	MN. CMR. LN	SUCT. SURF	MACH NO.	VELOCITY	VELOCITY	VELOCITY	VELOCITY	VELOCITY	VELOCITY	VELOCITY	VELOCITY	VELOCITY
1	64.562	6.182	2.412	0.9342	1030.091	932.773	932.773	932.773	932.773	932.773	932.773	932.773	932.773
2	62.303	6.913	2.163	0.8683	954.601	845.192	845.192	845.192	845.192	845.192	845.192	845.192	845.192
3	60.552	8.302	2.592	0.7986	874.391	760.506	760.506	760.506	760.506	760.506	760.506	760.506	760.506
4	58.550	8.840	2.270	0.7161	788.090	668.044	668.044	668.044	668.044	668.044	668.044	668.044	668.044
5	59.188	8.588	1.308	0.6063	669.479	562.818	562.818	562.818	562.818	562.818	562.818	562.818	562.818
RADIAL POSITION	REL. EXIT FLOW ANG.	REL. DEV. ANG. T.E.	REL. TURN ANGLE	EXIT REL. MACH NO.	EXIT REL. VELOCITY	EXIT REL. VELOCITY	EXIT REL. VELOCITY	EXIT REL. VELOCITY	EXIT REL. VELOCITY	EXIT REL. VELOCITY	EXIT REL. VELOCITY	EXIT REL. VELOCITY	EXIT REL. VELOCITY
1	51.833	1.653	13.129	0.6034	695.264	571.700	571.700	571.700	571.700	571.700	571.700	571.700	571.700
2	48.250	3.220	14.053	0.5454	624.265	514.544	514.544	514.544	514.544	514.544	514.544	514.544	514.544
3	42.790	6.620	17.762	0.4499	514.544	433.947	433.947	433.947	433.947	433.947	433.947	433.947	433.947
4	30.957	7.507	27.593	0.4459	506.357	376.416	376.416	376.416	376.416	376.416	376.416	376.416	376.416
5	15.228	9.448	43.960	0.4349	490.844	349.280	349.280	349.280	349.280	349.280	349.280	349.280	349.280
RADIAL POSITION	DIFFUSION FACTOR	ST. PRESS. RISE COEFF	CH1	INLET ARS TANG. VEL	EXIT ARS TANG. VEL	INLET REL TANG. VEL	EXIT REL TANG. VEL	INLET REL TANG. VEL	EXIT REL TANG. VEL	INLET REL TANG. VEL	EXIT REL TANG. VEL	INLET REL TANG. VEL	EXIT REL TANG. VEL
1	0.458	0.38469	0.4514	0.	0.	932.773	932.773	932.773	932.773	932.773	932.773	932.773	932.773
2	0.479	0.45257	0.4953	0.	0.	845.192	845.192	845.192	845.192	845.192	845.192	845.192	845.192
3	0.558	0.49719	0.5155	0.	0.	760.506	760.506	760.506	760.506	760.506	760.506	760.506	760.506
4	0.509	0.54986	0.5250	0.	0.	668.044	668.044	668.044	668.044	668.044	668.044	668.044	668.044
5	0.447	0.53449	0.4120	0.	0.	562.818	562.818	562.818	562.818	562.818	562.818	562.818	562.818
RADIAL POSITION	ADIABATIC EFFICIENCY	POLYTROPIC EFFICIENCY	TOT. PRESS. RATIO	TOT. TEMP. RATIO	FIXED INSTRUMENTATION PRESSURE RATIO	ABS. INLET FLOW ANG.	ABS. EXIT FLOW ANG.	ABS. INLET FLOW ANG.	ABS. EXIT FLOW ANG.	ABS. INLET FLOW ANG.	ABS. EXIT FLOW ANG.	ABS. INLET FLOW ANG.	ABS. EXIT FLOW ANG.
1	0.8482	0.8548	1.371	1.111	1.3550	0.	41.248	0.	41.248	0.	41.248	0.	41.248
2	0.9041	0.9082	1.358	1.101	0.9204	0.	42.428	0.	42.428	0.	42.428	0.	42.428
3	0.8449	0.8511	1.336	1.102	0.9237	0.	48.102	0.	48.102	0.	48.102	0.	48.102
4	0.9408	0.9433	1.352	1.096	154.06	0.	45.139	0.	45.139	0.	45.139	0.	45.139
5	0.9552	0.9572	1.368	1.098	0.99349	0.	46.827	0.	46.827	0.	46.827	0.	46.827
TRAVERSE PRESSURE RATIO = 1.3580													
TRAVERSE ADIABATIC EFF. = 0.8929													
TRAVERSE POLYTROPIC EFF. = 0.8975													
FLOW COEFFICIENT L.E. = 0.980													
FLOW COEFFICIENT T.E. = 0.950													
PERCENT DESIGN SPEED = 70													
L.E. CHECK WEIGHT FLOW/NOZ. WEIGHT FLOW = 0.99349													
T.E. CHECK WEIGHT FLOW/NOZ. WEIGHT FLOW = 0.95300													

PARAMETERS DETERMINED FROM FIXED INSTRUMENTATION

RADIAL POSITION	TOT. PRESS LOSS PARAM	ADIABATIC EFFICIENCY	LOSS COEFFICIENT	TOT. PRESS RATIO	TOT. TEMP RATIO
1	0.0304	0.8310	0.1340	1.365	1.112
2	0.0144	0.9197	0.0646	1.356	1.099
3	0.0175	0.9118	0.0788	1.340	1.096
4	0.0043	0.9819	0.0186	1.350	1.091
5	0.0015	0.9952	0.0067	1.362	1.093

Table 6. - Listing of Blade Element Performance (continued).

NASA - TASK 1 (ROTOR 2D)													
N.A.S.A. COMPRESSOR OUTPUT DATA													
BLADE ELEMENT PERFORMANCE RESULTS													
POINT NUMBER 13		READING NUMBER 33		DATE 4/27/1967									
RADIAL POSITION	REL. INLET FLOW ANG.	INCLD ANG MN. CMBR. LN	INCLD ANG SUCT. SURF	INLET REL MACH NO.	INLET REL VELOCITY	ROTOR SPD AT INLET	INLET ABS VELOCITY	INLET ABS MACH NO.	EXIT AX. VELOCITY	EXIT ABS MACH NO.	EXIT ABS VELOCITY	INLET AX. VELOCITY	INLET ABS VELOCITY
1	61.333	2.553	-1.217	1.2676	1369.929	1201.157	658.732	0.610	656.702	0.610	656.702	670.988	670.988
2	58.346	2.956	-1.794	1.1873	1278.642	1088.376	671.090	0.623	670.988	0.623	670.988	680.808	680.808
3	55.990	3.740	-1.970	1.0991	1183.256	979.324	664.092	0.617	660.808	0.617	660.808	629.106	629.106
4	53.822	4.112	-2.458	0.9962	1074.465	860.258	643.763	0.597	629.106	0.597	629.106	516.399	516.399
5	54.530	3.930	-3.350	0.8405	914.521	724.755	597.745	0.513	516.399	0.513	516.399		
RADIAL POSITION	REL. EXIT FLOW ANG.	REL. DEV. ANG. T.F.	REL. TURN ANGLE	EXIT REL. MACH NO.	EXIT REL. VELOCITY	ROTOR SPD AT EXIT	EXIT ABS VELOCITY	EXIT ABS MACH NO.	EXIT AX. VELOCITY	EXIT ABS MACH NO.	EXIT ABS VELOCITY	INLET AX. VELOCITY	INLET ABS VELOCITY
1	51.022	0.842	10.312	0.7774	912.514	1187.966	748.429	0.638	573.439	0.638	573.439	573.439	573.439
2	47.665	2.635	10.681	0.7119	828.117	1088.998	733.788	0.631	557.703	0.631	557.703	557.703	557.703
3	41.188	5.018	14.802	0.6216	722.218	991.341	749.740	0.645	543.082	0.645	543.082	543.082	543.082
4	32.083	8.633	21.739	0.5951	682.905	892.373	786.640	0.685	575.508	0.685	575.508	575.508	575.508
5	18.302	12.522	36.227	0.5658	643.928	795.338	856.431	0.753	596.291	0.753	596.291	596.291	596.291
RADIAL POSITION	DIFFUSION FACTOR	ST. PRESS RISE COEFF	CH1	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	ROTOR SPD AT INLET	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	AXIAL VEL. RATIO	AXIAL VEL. RATIO	AXIAL VEL. RATIO	AXIAL VEL. RATIO	AXIAL VEL. RATIO
1	0.462	0.37116	0.4723	0.45027	0.45027	479.276	1201.157	708.690	0.873	0.873	0.873	0.873	0.873
2	0.477	0.45027	0.5260	0.45027	0.45027	476.852	1088.376	612.145	0.831	0.831	0.831	0.831	0.831
3	0.523	0.51135	0.5602	0.5602	0.5602	516.103	979.324	475.238	0.822	0.822	0.822	0.822	0.822
4	0.500	0.56206	0.5670	0.5670	0.5670	531.601	860.258	360.772	0.915	0.915	0.915	0.915	0.915
5	0.456	0.53182	0.4440	0.4440	0.4440	598.106	724.755	197.232	1.155	1.155	1.155	1.155	1.155
RADIAL POSITION	ADIABATIC EFFICIENCY	POLYTROPIC EFFICIENCY	TOT. PRESS RATIO	TOT. TEMP RATIO	ABS. INLET FLOW ANG.	ABS. EXIT FLOW ANG.	ABS. INLET FLOW ANG.	ABS. EXIT FLOW ANG.	ABS. EXIT FLOW ANG.	ABS. EXIT FLOW ANG.	ABS. EXIT FLOW ANG.	ABS. EXIT FLOW ANG.	ABS. EXIT FLOW ANG.
1	0.8177	0.8301	1.650	1.188	0.	0.	0.	0.	0.	0.	0.	0.	0.
2	0.8892	0.8967	1.634	1.170	0.	0.	0.	0.	0.	0.	0.	0.	0.
3	0.8500	0.8598	1.617	1.173	0.	0.	0.	0.	0.	0.	0.	0.	0.
4	0.9321	0.9365	1.612	1.157	0.	0.	0.	0.	0.	0.	0.	0.	0.
5	0.9080	0.9139	1.598	1.158	0.	0.	0.	0.	0.	0.	0.	0.	0.
FIXED INSTRUMENTATION													
TRAVERSE PRESSURE RATIO = 1.6246													
TRAVERSE ADIABATIC EFF. = 0.8719													
TRAVERSE POLYTROPIC EFF. = 0.8804													
FLOW COEFFICIENT L.E. = 0.980													
FLOW COEFFICIENT T.E. = 0.950													
PERCENT DESIGN SPEED = 90													
PRESSURE RATIO													
ADIABATIC EFF. = 0.9180													
POLYTROPIC EFF. = 0.9234													
NOZZLE WEIGHT FLOW = 212.89													
L.E. CHECK WEIGHT FLOW/NOZ. WEIGHT FLOW = 0.99077													
T.E. CHECK WEIGHT FLOW/NOZ. WEIGHT FLOW = 0.96487													

PARAMETERS DETERMINED FROM FIXED INSTRUMENTATION

RADIAL POSITION	TOT. PRESS LOSS PARAM	ADIABATIC EFFICIENCY	LOSS COEFFICIENT	TOT. PRESS RATIO	TOT. TEMP RATIO
1	0.0339	0.8229	0.1470	1.636	1.184
2	0.0142	0.9252	0.0630	1.644	1.165
3	0.0162	0.9215	0.0711	1.617	1.160
4	0.0011	0.9949	0.0050	1.608	1.146
5	0.0078	0.9722	0.0350	1.586	1.145

Table 6. - Listing of Blade Element Performance (continued).

NASA - TASK I (ROTOR 2D)

N.A.S.A. COMPRESSOR OUTPUT DATA
BLADE ELEMENT PERFORMANCE RESULTS

POINT NUMBER 14 READING NUMBER 34 DATE 4/27/1967

RADIAL POSITION	REL. INLET FLOW ANG.	INCID ANG MN. CMR/LN	INCID ANG SUCT. SURF	INLET REL MACH NO.	INLET REL VELOCITY	ROTOR SPD AT INLET	INLET ABS VELOCITY	INLET ABS MACH NO.	INLET AX. VELOCITY
1	61.503	2.723	-1.047	1.2656	1367.331	1200.820	653.931	0.605	651.915
2	58.636	3.246	-1.504	1.1826	1274.318	1088.070	663.317	0.616	663.216
3	56.751	4.501	-1.209	1.0865	1172.446	979.049	645.052	0.598	641.862
4	54.995	5.285	-1.285	0.9795	1058.066	860.017	616.341	0.571	602.307
5	55.737	5.137	-2.143	0.8257	899.534	724.552	533.091	0.489	493.573
RADIAL POSITION	REL. DEV. ANG. T.T.F.	REL. TURN ANGLE	EXIT REL. MACH NO.	EXIT REL. VELOCITY	ROTOR SPD AT EXIT	EXIT ABS VELOCITY	EXIT ABS MACH NO.	EXIT AX. VELOCITY	
1	50.368	0.188	0.7428	875.089	1187.632	759.619	0.645	557.626	
2	47.312	2.282	0.6910	806.125	1088.692	738.181	0.633	546.550	
3	40.482	4.312	0.6054	703.781	991.063	756.704	0.651	534.879	
4	31.511	8.061	0.5804	666.319	892.122	788.576	0.687	564.975	
5	17.564	12.184	0.5448	620.392	795.115	848.729	0.745	575.554	
RADIAL POSITION	DIFFUSION FACTOR	ST. PRESS RISE COEFF	CHI	INLET ABS TANG. VEL	EXIT ABS TANG. VEL	INLET REL TANG. VEL	EXIT REL TANG. VEL	AXIAL VFL. RATIO	
1	0.497	0.38780	0.4894	0.	514.347	1200.820	673.285	0.855	
2	0.498	0.46747	0.5424	0.	496.156	1088.070	592.535	0.824	
3	0.539	0.52172	0.5687	0.	534.527	979.049	456.536	0.833	
4	0.512	0.56908	0.5706	0.	545.751	860.017	346.371	0.938	
5	0.476	0.55009	0.4563	0.	608.505	724.552	186.610	1.166	
RADIAL POSITION	ADIABATIC EFFICIENCY	POLYTROPIC EFFICIENCY	TOT. PRESS RATIO	TOT. TEMP RATIO	ABS. INLET FLOW ANG.	ABS. EXIT FLOW ANG.			
1	0.8055	0.8193	1.691	1.201	0.	42.688			
2	0.8821	0.8993	1.664	1.178	0.	42.233			
3	0.8665	0.8755	1.643	1.176	0.	44.981			
4	0.9298	0.9345	1.631	1.162	0.	44.008			
5	0.9134	0.9191	1.609	1.160	0.	46.594			

TRAVERSE PRESSURE RATIO = 1.6460
 TRAVERSE ADIBATIC EFF. = 0.9174
 TRAVERSE POLYTROPIC EFF. = 0.9230
 FLOW COEFFICIENT L.F. = 0.980
 FLOW COEFFICIENT T.E. = 0.950
 PERCENT DESIGN SPEED = 90

FIXED INSTRUMENTATION PRESSURE RATIO = 1.6460
 ADIBATIC EFF. = 0.9174
 POLYTROPIC EFF. = 0.9230
 NOZZLE WEIGHT FLOW = 209.41
 L.E. CHECK WEIGHT FLOW/NOZ. WEIGHT FLOW = 0.99078
 T.E. CHECK WEIGHT FLOW/NOZ. WEIGHT FLOW = 0.96849

PARAMETERS DETERMINED FROM FIXED INSTRUMENTATION

RADIAL POSITION	TOT. PRESS LOSS PARAM	ADIBATIC EFFICIENCY	LOSS COEFFICIENT	TOT. PRESS RATIO	TOT. TEMP RATIO
1	0.0356	0.8233	0.1522	1.671	1.192
2	0.0153	0.9230	0.0675	1.675	1.172
3	0.0156	0.9283	0.0677	1.646	1.165
4	0.0021	0.9910	0.0092	1.622	1.150
5	0.0089	0.9694	0.0401	1.596	1.148

Table 6. - Listing of Blade Element Performance (continued).

NASA - TASK I (ROTOR 2D)

N.A.S.A. COMPRESSOR OUTPUT DATA
BLADE ELEMENT PERFORMANCE RESULTS

POINT NUMBER 15 READING NUMBER 35 DATE 4/27/1967

RADIAL POSITION	REL. INLET FLOW ANG.	INCID ANG MN. CORR. LN	INCID ANG SUCT. SURF	INLET REL. MACH NO.	INLET REL. VELOCITY	ROTOR SPD AT INLET	INLET ABS. VELOCITY	INLET ABS. MACH NO.	INLET AX. VELOCITY
1	62.251	3.471	-0.299	1.2532	1357.256	1200.364	633.460	0.585	831.507
2	59.208	3.818	-0.932	1.1746	1266.194	1087.657	648.267	0.601	648.168
3	56.548	4.698	-1.012	1.0834	1169.354	978.677	639.983	0.593	636.819
4	54.884	5.174	-1.396	0.9802	1059.140	859.690	618.636	0.573	604.550
5	56.066	5.466	-1.814	0.8202	895.328	724.276	526.342	0.482	487.324
RADIAL POSITION	REL. EXIT FLOW ANG.	REL. DEV. ANG. T.F.	REL. TURN ANGLE	EXIT REL. MACH NO.	EXIT REL. VELOCITY	ROTOR SPD AT EXIT	EXIT ABS. VELOCITY	EXIT ABS. MACH NO.	EXIT AX. VELOCITY
1	49.667	-0.513	12.584	0.7136	843.361	1187.181	771.858	0.653	545.290
2	47.070	2.040	12.138	0.6712	783.821	1088.278	741.357	0.635	533.852
3	40.665	4.495	16.283	0.5920	688.927	990.686	753.186	0.647	522.162
4	32.720	9.270	22.164	0.5668	652.461	891.783	771.545	0.670	546.022
5	18.786	13.006	37.280	0.5316	606.868	794.813	834.848	0.731	560.462
RADIAL POSITION	DIFFUSION FACTOR	ST. PRESS RISE COEFF	CH1	INLET ABS. TANG. VEL	EXIT ABS. TANG. VFL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	AXIAL VFL. RATIO	
1	0.525	0.39854	0.4992	0.	544.948	1200.364	642.233	0.863	
2	0.517	0.47772	0.5516	0.	514.383	1087.657	573.895	0.824	
3	0.552	0.54375	0.5894	0.	542.113	978.677	448.573	0.820	
4	0.524	0.59861	0.5988	0.	540.969	859.690	350.815	0.903	
5	0.487	0.58499	0.4885	0.	604.173	724.276	190.640	1.150	
RADIAL POSITION	ADIABATIC EFFICIENCY	POLYTROPIC EFFICIENCY	TOT. PRESS RATIO	TOT. TEMP RATIO	ABS. INLET FLOW ANG.	ABS. EXIT FLOW ANG.			
1	0.8042	0.8187	1.731	1.211	0.	44.982			
2	0.8792	0.8877	1.688	1.184	0.	43.936			
3	0.8807	0.8890	1.665	1.178	0.	46.074			
4	0.9328	0.9373	1.633	1.162	0.	44.734			
5	0.9274	0.9322	1.613	1.158	0.	47.149			
TRAVERSE PRESSURE RATIO = 1.6714									
TRAVERSE ADIABATIC EFF. = 0.8735									
TRAVERSE POLYTROPIC EFF. = 0.8823									
FLOW COEFFICIENT L.F. = 0.980									
FLOW COEFFICIENT T.E. = 0.950									
PERCENT DESIGN SPEED = 90									
FIXED INSTRUMENTATION PRESSURE RATIO = 1.6590									
ADIABATIC EFF. = 0.9156									
POLYTROPIC EFF. = 0.9214									
NOZZLE WEIGHT FLOW = 205.74									
L.E. CHECK WEIGHT FLOW/NOZ. WEIGHT FLOW = 0.99746									
T.E. CHECK WEIGHT FLOW/NOZ. WEIGHT FLOW = 0.97062									

PARAMETERS DETERMINED FROM FIXED INSTRUMENTATION

RADIAL POSITION	TOT. PRESS LOSS PARAM	ADIABATIC EFFICIENCY	LOSS COEFFICIENT	TOT. PRESS RATIO	TOT. TEMP RATIO
1	0.0394	0.8133	0.1660	1.684	1.198
2	0.0165	0.9197	0.0724	1.693	1.176
3	0.0152	0.9310	0.0663	1.660	1.167
4	0.0017	0.9926	0.0076	1.629	1.151
5	0.0075	0.9747	0.0339	1.607	1.149

Table 6. - Listing of Blade Element Performance (continued).

NASA - TASK 1 (ROTOR 2D)

N.A.S.A. COMPRESSOR OUTPUT DATA
BLADE ELEMENT PERFORMANCE RESULTS

POINT NUMBER 16 READING NUMBER 36 DATE 4/27/1967

RADIAL POSITION	REL. INLET FLOW ANG.	INCID. ANG. MN. CMR. LN	INCID. SURF SUCT. SURF	INLET REL. MACH NO.	INLET REL. VELOCITY	ROTOR SPD AT INLET	INLET ABS. VELOCITY	INLET ABS. MACH NO.	INLET AX. VELOCITY
1	61.635	2.455	-0.915	1.5718	1669.290	1467.844	794.961	0.749	792.510
2	56.352	3.962	-0.788	1.4573	1546.036	1330.023	788.206	0.743	788.086
3	57.572	5.322	-0.388	1.3358	1419.872	1196.759	764.072	0.719	760.294
5	56.409	5.899	-1.381	1.0089	1088.718	885.669	633.164	0.587	586.228
RADIAL POSITION	REL. EXIT FLOW ANG.	REL. DEV. ANG. T.E.	REL. TURN ANGLE	EXIT REL. MACH NO.	EXIT REL. VELOCITY	ROTOR SPD AT EXIT	EXIT ABS. VELOCITY	EXIT ABS. MACH NO.	EXIT AX. VELOCITY
1	53.109	2.929	8.526	1.3126	1459.483	1451.724	922.766	0.830	875.354
2	52.466	7.436	6.885	1.1468	1289.455	1330.782	843.906	0.751	785.559
3	61.590	15.420	5.982	0.9082	1038.324	1211.444	758.587	0.664	644.750
5	15.293	9.513	41.207	0.8570	943.728	971.923	1167.781	1.060	887.188
RADIAL POSITION	DIFFUSION FACTOR	ADHATIC EFFICIENCY	ST. PRESS RISE COEFF	CHI	INLET ABS. TANG. VEL	EXIT ABS. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	AXIAL VEL. RATIO
1	0.188	0.7226	0.07800	0.1451	0.	285.491	1467.844	1166.233	1.105
2	0.233	0.7257	0.14218	0.2091	0.	308.264	1330.023	1022.518	0.997
3	0.354	0.4865	0.17011	0.2170	0.	398.258	1196.759	813.186	0.848
5	0.297	0.8470	0.06301	-0.0561	0.	729.341	885.669	242.583	1.513
RADIAL POSITION	TRAVERSE PRESSURE RATIO	ADHATIC EFFICIENCY	POLYTROPIC EFFICIENCY	TOT. PRESS RATIO	TOT. TEMP RATIO	FIXED INSTRUMENTATION	ABS. INLET FLOW ANG.	ABS. EXIT FLOW ANG.	ABS. EXIT FLOW ANG.
1	0.7182	0.6937	0.7340	1.343	1.122	0.	0.	18.063	18.063
2	0.6937	0.5261	0.7373	1.358	1.126	0.	0.	21.426	21.426
3	0.5261	0.8438	0.5030	1.262	1.141	0.	0.	31.703	31.703
5	0.8438	0.1974	0.8581	1.703	1.194	0.	0.	39.423	39.423
PRESSURE RATIO = 1.4400 ADIABATIC EFF. = 0.7455 POLYTROPIC EFF. = 0.7582 NOZZLE WEIGHT FLOW = 233.90 L.E. CHECK WEIGHT FLOW/NOZ. WEIGHT FLOW = 0.98500 T.E. CHECK WEIGHT FLOW/NOZ. WEIGHT FLOW =									

PARAMETERS DETERMINED FROM FIXED INSTRUMENTATION

RADIAL POSITION	TOT. PRESS LOSS PARAM	ADIABATIC EFFICIENCY	LOSS COEFFICIENT	TOT. PRESS RATIO	TOT. TEMP RATIO
1	0.0282	0.7182	0.1279	1.322	1.116
2	0.0345	0.6937	0.1691	1.361	1.133
3	0.0532	0.5261	0.2825	1.269	1.134
5	0.0446	0.8438	0.1974	1.712	1.197

Table 6. - Listing of Blade Element Performance (continued).

NASA - TASK 1 (ROTOR 2D)

N.A.S.A. COMPRESSOR OUTPUT DATA
BLADE ELEMENT PERFORMANCE RESULTS

POINT NUMBER 17 READING NUMBER 37 DATE 4/27/1967

RADIAL POSITION	REL. INLET FLOW ANG.	INCID. ANG. MN. CTR. LN	SLCT. SURF. -0.717	INLET REL. VELOCITY 1.5698	INLET REL. VELOCITY 1.668.102	ROTOR SPD. AT INLET 1469.550	INLET ARS. VELOCITY 789.294	INLET ABS. MACH NO. 0.743	INLET AX. VLOCITY 786.861
1	61.233	3.053	-0.717	1.5698	1.668.102	1469.550	789.294	0.743	786.861
2	59.451	4.063	-0.689	1.4569	1.546.254	1331.569	786.019	0.741	785.899
3	57.441	5.191	-0.519	1.3410	1.423.615	1198.150	768.841	0.724	765.040
4	55.372	5.662	-0.308	1.2102	1.288.755	1052.479	743.758	0.698	726.824
5	56.316	5.716	-1.564	1.0132	1.092.550	886.699	638.303	0.592	590.986
RADIAL POSITION	REL. EXIT FLOW ANG.	REL. DEV. ANG. T.E.	REL. TURN ANGLE	EXIT REL. MACH NO.	EXIT REL. VELOCITY	ROTOR SPD. AT EXIT 1453.412	EXIT ARS. VELOCITY 935.476	EXIT ARS. MACH NO. 0.795	EXIT AX. VLOCITY 757.875
1	50.136	-0.044	11.697	1.0055	1.183.590	1453.412	935.476	0.795	757.875
2	47.576	2.546	11.875	0.9230	1.077.625	1332.329	903.741	0.774	726.966
3	48.827	12.657	8.614	0.7075	835.399	1212.852	802.780	0.680	549.642
4	25.295	1.845	30.076	0.7838	893.837	1091.770	1077.985	0.945	803.199
5	13.306	7.526	43.011	0.8040	899.296	973.053	1167.554	1.044	852.543
RADIAL POSITION	DIFFUSION FACTOR	ST. PRESS. RISE COEFF	CH1	INLET ARS. TANG. VEL	EXIT ARS. TANG. VEL	INLET REL. TANG. VEL 1469.550	EXIT REL. TANG. VEL 907.561	AXIAL VFL. RATIO 0.963	AXIAL VFL. RATIO 0.925
1	0.410	0.2210	0.3413	0.	0.	1469.550	907.561	0.963	0.925
2	0.419	0.29816	0.3986	0.	0.	1331.569	795.460	0.925	0.925
3	0.538	0.33542	0.4088	0.	0.	1198.150	628.455	0.718	0.718
4	0.458	0.30184	0.3240	0.	0.	1052.479	379.592	1.105	1.105
5	0.350	0.17343	0.0764	0.	0.	886.699	201.624	1.443	1.443
RADIAL POSITION	ADIBATIC EFFICIENCY	POLYTROPIC EFFICIENCY	TOT. PRESS. RATIO	TOT. TEMP. RATIO	FIXED INSTRUMENTATION	PRESSURE RATIO = 1.748	ADIBATIC EFF. = 0.7944	POLYTROPIC EFF. = 0.8099	NOZZLE WEIGHT FLOW = 233.91
1	0.7169	0.7385	1.766	1.246		1.748	0.7944	0.8099	233.91
2	0.8111	0.8259	1.786	1.223		1.748	0.7944	0.8099	233.91
3	0.6255	0.6488	1.583	1.225		1.748	0.7944	0.8099	233.91
4	0.8247	0.8392	1.848	1.233		1.748	0.7944	0.8099	233.91
5	0.8303	0.8440	1.824	1.226		1.748	0.7944	0.8099	233.91
TRAVERSE PRESSURE RATIO = 1.7670	ADIBATIC EFF. = 0.7635	TRAVERSE ADIBATIC EFF. = 0.7816	TRAVERSE POLYTROPIC EFF. = 0.980	FLOW COEFFICIENT L.E. = 0.950	FLOW COEFFICIENT T.E. = 110	PERCENT DESIGN SPEED	PERCENT DESIGN SPEED	PERCENT DESIGN SPEED	PERCENT DESIGN SPEED
1	0.0544	0.7124	0.2315	1.714	1.234				
2	0.0412	0.7872	0.1824	1.762	1.223				
3	0.0487	0.7157	0.2444	1.609	1.204				
4	0.0313	0.8771	0.1281	1.812	1.211				
5	0.0324	0.8953	0.1424	1.847	1.214				

PARAMETERS DETERMINED FROM FIXED INSTRUMENTATION

RADIAL POSITION	TOT. PRESS. LOSS PARAM	ADIBATIC EFFICIENCY	LOSS COEFFICIENT	TOT. PRESS. RATIO	TOT. TEMP. RATIO
1	0.0544	0.7124	0.2315	1.714	1.234
2	0.0412	0.7872	0.1824	1.762	1.223
3	0.0487	0.7157	0.2444	1.609	1.204
4	0.0313	0.8771	0.1281	1.812	1.211
5	0.0324	0.8953	0.1424	1.847	1.214

Table 6. - Listing of Blade Element Performance (continued).

NASA - TASK 1 (ROTOR 2D)

N.A.S.A. COMPRESSOR OUTPUT DATA
BLADE ELEMENT PERFORMANCE RESULTS

POINT NUMBER 18 READING NUMBER 38 DATE 4/27/1967

RADIAL POSITION	REL. INLET FLOW ANG.	INCID. ANG. MIN. CMR. LN	INCID. ANG. SUCT. SUPE	INLET REL. MACH NO.	INLET REL. VELOCITY	ROTOR SPD. AT INLET	INLET ABS. VELOCITY	INLET ABS. MACH NO.	INLET AX. VELOCITY
1	61.867	3.087	-0.683	1.5672	1665.264	1467.515	787.085	0.741	784.659
2	50.452	4.062	-0.688	1.4564	1544.094	1329.725	784.893	0.740	784.774
3	57.697	5.447	-0.263	1.3340	1417.591	1196.491	760.247	0.715	756.488
4	55.624	5.914	-0.656	1.2049	1282.957	1051.022	735.752	0.691	719.000
5	56.566	5.966	-1.314	1.0086	1087.543	885.471	631.420	0.586	584.613
RADIAL POSITION	REL. EXIT FLOW ANG.	REL. DEV. ANG. T.E.	REL. TURN ANGLE	EXIT REL. MACH NO.	EXIT REL. VELOCITY	ROTOR SPD. AT EXIT	EXIT ABS. VELOCITY	EXIT ABS. MACH NO.	EXIT AX. VELOCITY
1	49.723	-0.457	12.144	0.9517	1134.038	1451.399	940.041	0.789	732.383
2	46.942	1.912	12.510	0.8738	1028.310	1330.484	910.123	0.773	702.051
3	45.280	9.110	12.417	0.6703	794.123	1211.173	855.370	0.722	558.403
4	25.267	1.817	30.357	0.7111	819.833	1090.258	1049.960	0.911	736.871
5	14.851	9.071	41.715	0.7321	829.899	971.706	1109.104	0.978	781.719
RADIAL POSITION	DIFFUSION FACTOR	ST. PRESS RISE COEFF	CHI	INLET ABS. TANG. VEL	EXIT ABS. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	AXIAL VEL. RATIO	
1	0.448	0.25487	0.3803	0.	587.086	1467.515	864.313	0.933	
2	0.460	0.33297	0.4367	0.	579.147	1329.725	751.337	0.895	
3	0.579	0.37811	0.4529	0.	647.292	1196.491	563.880	0.738	
4	0.520	0.38021	0.4066	0.	742.462	1051.022	347.796	1.025	
5	0.409	0.31826	0.2358	0.	764.425	885.471	207.281	1.337	
RADIAL POSITION	ADIABATIC EFFICIENCY	POLYTROPIC EFFICIENCY	TOT. PRESS RATIO	TOT. TEMP RATIO	ARS. INLET FLOW ANG.	ARS. EXIT FLOW ANG.			
1	0.7029	0.7275	1.840	1.276	0.	38.716			
2	0.8032	0.8197	1.873	1.245	0.	39.520			
3	0.6876	0.7108	1.730	1.247	0.	49.216			
4	0.8265	0.8417	1.924	1.249	0.	45.217			
5	0.8528	0.8653	1.888	1.234	0.	44.359			
TRANSVERSE PRESSURE RATIO = 1.8579									
TRANSVERSE ADIABATIC EFF. = 0.7690									
TRANSVERSE POLYTROPIC EFF. = 0.7882									
FLOW COEFFICIENT L.E. = 0.980									
FLOW COEFFICIENT T.E. = 0.950									
PERCENT DESIGN SPEED = 110									
PRESSURE RATIO = 1.829									
ADIABATIC EFF. = 0.8099									
POLYTROPIC EFF. = 0.8253									
NOZZLE WEIGHT FLOW = 233.84									
L.E. CHECK WEIGHT FLOW/NOZ. WEIGHT FLOW = 0.98436									
T.E. CHECK WEIGHT FLOW/NOZ. WEIGHT FLOW = 1.03716									

PARAMETERS DETERMINED FROM FIXED INSTRUMENTATION

RADIAL POSITION	TOT. PRESS LOSS PARAM	ADIABATIC EFFICIENCY	LOSS COEFFICIENT	TOT. PRESS RATIO	TOT. TEMP RATIO
1	0.0610	0.7027	0.2571	1.791	1.258
2	0.0391	0.8106	0.1711	1.850	1.237
3	0.0471	0.7651	0.2208	1.739	1.224
4	0.0324	0.8790	0.1325	1.872	1.223
5	0.0225	0.9284	0.0996	1.900	1.217

Table 6. - Listing of Blade Element Performance (continued).

NASA - TASK 1 (ROTOR 20)

N.A.S.A. COMPRESSOR OUTPUT DATA
BLADE ELEMENT PERFORMANCE RESULTS

POINT NUMBER 19 READING NUMBER 39 DATE 4/27/1967

RADIAL POSITION	REL. INLET FLOW ANG.	INCID. ANG. MW. CORR. LN	INCID. ANG. SUCT. SURF	INLET REL. MACH NO.	INLET REL. VELOCITY	ROTOR SPD. AT INLET	INLET ABS. VELOCITY	INLET ABS. MACH NO.	INLET AX. VELOCITY
1	62.152	3.372	-0.398	0.5620	1661.462	1468.060	777.981	0.731	775.983
2	59.657	4.267	-0.483	1.4524	1541.414	1330.218	778.767	0.734	778.648
3	57.518	5.268	-0.442	1.3378	1420.945	1196.935	765.788	0.721	762.002
4	55.240	5.530	-1.040	1.2124	1289.569	1051.412	746.673	0.702	729.672
5	54.232	5.632	-1.648	1.0139	1092.641	895.799	639.706	0.594	592.285
RADIAL POSITION	REL. EXIT FLOW ANG.	REL. TURN ANG. T.F.	REL. TURN ANGLE	EXIT REL. MACH NO.	EXIT REL. VELOCITY	ROTOR SPD. AT EXIT	EXIT ABS. VELOCITY	EXIT ABS. MACH NO.	EXIT AX. VELOCITY
1	48.378	-1.802	13.774	0.8883	1067.684	1451.938	965.855	0.804	708.408
2	47.173	2.143	12.484	0.8252	978.539	1330.978	904.799	0.763	665.184
3	45.326	9.156	12.192	0.6387	760.145	1211.622	858.399	0.721	534.076
4	45.653	2.203	29.586	0.6712	780.112	1090.663	1032.421	0.888	698.949
5	44.364	10.584	39.867	0.6860	784.995	972.066	1068.624	0.934	734.256
RADIAL POSITION	DIFFUSION FACTOR	ST. PRESS. RISE COEFF	CH1	INLET ABS. TANG. VEL	EXIT ABS. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET ABS. MACH NO.	EXIT ABS. MACH NO.
1	0.501	0.27122	0.3988	0.	654.659	1468.080	797.278	0.913	708.408
2	0.498	0.35917	0.4641	0.	613.318	1330.218	717.660	0.854	665.184
3	0.609	0.41894	0.4951	0.	671.437	1196.935	540.185	0.701	534.076
4	0.556	0.44739	0.4761	0.	754.983	1051.412	335.680	0.958	698.949
5	0.451	0.42680	0.3503	0.	756.458	885.799	215.609	1.240	734.256
RADIAL POSITION	ADIABATIC EFFICIENCY	POLYTROPIC EFFICIENCY	TOT. PRESS. RATIO	TOT. TEMP. RATIO	ABS. INLET FLOW ANG.	ABS. EXIT FLOW ANG.	FIXED INSTRUMENTATION PRESSURE RATIO	ADIABATIC EFF.	POLYTROPIC EFF.
1	0.6896	0.7171	1.948	1.304	0.	42.742	= 1.8890	= 0.8138	= 0.8297
2	0.7916	0.8098	1.924	1.260	0.	42.677	= 0.8138	= 0.8297	= 0.8297
3	0.7142	0.7368	1.804	1.257	0.	51.500	= 0.8138	= 0.8297	= 0.8297
4	0.8359	0.8509	1.989	1.260	0.	47.207	= 0.8138	= 0.8297	= 0.8297
5	0.8659	0.8777	1.928	1.239	0.	45.853	= 0.8138	= 0.8297	= 0.8297
TRAVERSE PRESSURE RATIO = 1.9227									
TRAVERSE ADIABATIC EFF. = 0.7694									
TRAVERSE POLYTROPIC EFF. = 0.7895									
FLOW COEFFICIENT C.F. = 0.980									
FLOW COEFFICIENT T.F. = 0.950									
PERCENT DESIGN SPEED = 110									

PARAMETERS DETERMINED FROM FIXED INSTRUMENTATION

RADIAL POSITION	TOT. PRESS. LOSS PARAM	ADIABATIC EFFICIENCY	LOSS COEFFICIENT	TOT. PRESS. RATIO	TOT. TEMP. RATIO
1	0.0645	0.7120	0.2645	1.882	1.278
2	0.0399	0.8149	0.1756	1.920	1.252
3	0.0460	0.7802	0.2157	1.808	1.236
4	0.0354	0.8702	0.1451	1.901	1.232
5	0.0193	0.9386	0.0861	1.930	1.220

Table 6. - Listing of Blade Element Performance (continued).

NASA - TASK 1 (ROTOR 2D)													
N.A.S.A. COMPRESSOR OUTPUT DATA													
BLADE ELEMENT PERFORMANCE RESULTS													
POINT NUMBER		20	READING NUMBER		40	DATE		4/27/1967					
RADIAL POSITION	REL. INLET FLOW ANG.	INCID. ANG. MN. CMR. LN	INCID. ANG. SUCT. SURF	INLET REL. MACH NO.	INLET REL. VELOCITY	ROTOR SPD. AT INLET	INLET ABS. VELOCITY	INLET ABS. MACH NO.	INLET AX. VELOCITY	EXIT REL. MACH NO.	EXIT REL. VELOCITY	ROTOR SPD. AT EXIT	EXIT ABS. VELOCITY
1	62.095	3.315	-0.455	1.5613	1661.108	1466.971	779.279	0.732	776.877	0.805	971.193	1450.861	703.706
2	59.629	4.239	-0.511	1.4517	1540.713	1329.232	779.062	0.734	778.944	0.764	907.893	1329.991	658.180
3	57.762	5.132	-0.198	1.3322	1416.041	1196.047	758.051	0.713	754.303	0.725	864.029	1210.724	531.591
4	55.730	6.020	-0.550	1.2021	1280.821	1050.632	732.580	0.688	715.900	0.896	1041.148	1089.854	704.426
5	56.589	5.989	-1.291	1.0071	1086.826	895.143	630.646	0.584	583.896	0.937	1072.787	971.346	732.453
RADIAL POSITION	REL. EXIT FLOW ANG.	REL. DEV. ANG. T.F.	REL. TURN ANGLE	EXIT REL. MACH NO.	EXIT REL. VELOCITY	ROTOR SPD. AT EXIT	EXIT ABS. VELOCITY	EXIT ABS. MACH NO.	EXIT AX. VELOCITY	INLET REL. MACH NO.	INLET REL. VELOCITY	ROTOR SPD. AT INLET	INLET ABS. VELOCITY
1	48.045	-2.115	14.030	0.8743	1054.152	1450.861	971.193	0.805	703.706	0.764	907.893	1329.991	658.180
2	46.953	1.923	12.676	0.8115	964.252	1329.991	907.893	0.764	658.180	0.725	864.029	1210.724	531.591
3	44.922	8.752	12.840	0.6307	751.282	1210.724	864.029	0.725	531.591	0.896	1041.148	1089.854	704.426
4	24.974	1.524	30.756	0.6729	781.880	1089.854	1041.148	0.896	704.426	0.937	1072.787	971.346	732.453
5	15.795	10.015	40.794	0.6824	780.938	971.346	1072.787	0.937	732.453				
RADIAL POSITION	DIFFUSION FACTOR	ST. PRESS. RISE COEFF	CH1	INLET ABS. TANG. VEL	EXIT ABS. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET ABS. TANG. VEL	EXIT ABS. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET ABS. TANG. VEL	EXIT ABS. TANG. VEL
1	0.512	0.28080	0.4097	0.	667.527	1466.971	971.193	1466.971	971.193	1466.971	971.193	1466.971	971.193
2	0.510	0.36812	0.4733	0.	625.329	1329.232	907.893	1329.232	907.893	1329.232	907.893	1329.232	907.893
3	0.616	0.42445	0.4998	0.	680.574	1196.047	864.029	1196.047	864.029	1196.047	864.029	1196.047	864.029
4	0.553	0.44473	0.4717	0.	761.769	1050.632	1041.148	1050.632	1041.148	1050.632	1041.148	1050.632	1041.148
5	0.453	0.42889	0.3505	0.	764.156	895.143	1072.787	895.143	1072.787	895.143	1072.787	895.143	1072.787
RADIAL POSITION	ADRIATIC EFFICIENCY	POLYTROPIC EFFICIENCY	TOT. PRESS. RATIO	TOT. TEMP. RATIO	ADRIATIC EFF. =	POLYTROPIC EFF. =	TOT. PRESS. RATIO =	TOT. TEMP. RATIO =	ADRIATIC EFF. =	POLYTROPIC EFF. =	TOT. PRESS. RATIO =	TOT. TEMP. RATIO =	ADRIATIC EFF. =
1	0.6895	0.7175	1.980	1.313	0.8128	0.8290	1.980	1.313	0.8128	0.8290	1.980	1.313	0.8128
2	0.7903	0.8089	1.946	1.265	0.8128	0.8290	1.946	1.265	0.8128	0.8290	1.946	1.265	0.8128
3	0.7171	0.7399	1.824	1.262	0.8128	0.8290	1.824	1.262	0.8128	0.8290	1.824	1.262	0.8128
4	0.6408	0.8566	2.009	1.263	0.8128	0.8290	2.009	1.263	0.8128	0.8290	2.009	1.263	0.8128
5	0.8752	0.8863	1.943	1.239	0.8128	0.8290	1.943	1.239	0.8128	0.8290	1.943	1.239	0.8128
PARAMETERS DETERMINED FROM FIXED INSTRUMENTATION													
RADIAL POSITION	TOT. PRESS. LOSS PARAM	ADRIATIC EFFICIENCY	LOSS COEFFICIENT	TOT. PRESS. RATIO	TOT. TEMP. RATIO	ADRIATIC EFF. =	POLYTROPIC EFF. =	TOT. PRESS. RATIO =	TOT. TEMP. RATIO =	ADRIATIC EFF. =	POLYTROPIC EFF. =	TOT. PRESS. RATIO =	TOT. TEMP. RATIO =
1	0.0661	0.7119	0.2696	1.910	1.285	0.8128	0.8290	1.910	1.285	0.8128	0.8290	1.910	1.285
2	0.0403	0.8169	0.1766	1.947	1.257	0.8128	0.8290	1.947	1.257	0.8128	0.8290	1.947	1.257
3	0.0469	0.7813	0.2187	1.829	1.241	0.8128	0.8290	1.829	1.241	0.8128	0.8290	1.829	1.241
4	0.0377	0.8649	0.1538	1.909	1.235	0.8128	0.8290	1.909	1.235	0.8128	0.8290	1.909	1.235
5	0.0199	0.9379	0.0885	1.939	1.222	0.8128	0.8290	1.939	1.222	0.8128	0.8290	1.939	1.222

L.F. CHECK WEIGHT FLOW/NOZ. WEIGHT FLOW = 0.98473
T.E. CHECK WEIGHT FLOW/NOZ. WEIGHT FLOW = 1.02609

Table 6. - Listing of Blade Element Performance (continued).

NASA - TASK I (ROTOR 2D)													
N.A.S.A. COMPRESSOR OUTPUT DATA													
BLADE ELEMENT PERFORMANCE RESULTS													
POINT NUMBER		21		READING NUMBER		41		DATE		4/27/1967			
RADIAL POSITION	INLET ANG. MACH. NO.	INLET SURF. SUCT. SURF.	INLET REL. MACH. NO.	INLET REL. VELOCITY	ROTOR SPD. AT INLET	INLET ABS. VELOCITY	INLET ABS. MACH. NO.	INLET AX. VELOCITY	INLET AX. MACH. NO.	INLET ABS. MACH. NO.	INLET ABS. VELOCITY	INLET ABS. MACH. NO.	INLET AX. VELOCITY
1	3.683	-0.087	1.5535	1656.900	1468.221	767.884	0.720	765.516	0.720	774.731	774.731	0.730	759.861
2	4.396	-0.354	1.4495	1539.565	1330.364	774.849	0.730	774.731	0.730	774.731	774.731	0.730	759.861
3	5.344	-0.366	1.3361	1419.897	1197.066	763.637	0.719	759.861	0.719	759.861	759.861	0.697	724.643
4	5.719	-0.852	1.2087	1286.690	1051.527	741.526	0.697	724.643	0.697	724.643	724.643	0.594	592.311
5	5.633	-1.647	1.0141	1092.736	885.896	639.734	0.594	592.311	0.594	592.311	592.311	0.594	592.311
RADIAL POSITION	REL. DEV. ANG. T.F.	REL. TURN ANGLE	EXIT REL. MACH. NO.	EXIT REL. VELOCITY	ROTOR SPD. AT EXIT	EXIT ABS. VELOCITY	EXIT ABS. MACH. NO.	EXIT AX. VELOCITY	EXIT AX. MACH. NO.	EXIT ABS. MACH. NO.	EXIT ABS. VELOCITY	EXIT ABS. MACH. NO.	EXIT AX. VELOCITY
1	-2.065	14.368	0.8408	1018.791	1452.097	973.061	0.803	879.707	0.803	879.707	879.707	0.803	879.707
2	1.545	13.211	0.7064	948.389	1331.124	915.225	0.769	851.917	0.769	851.917	851.917	0.722	519.179
3	9.141	12.283	0.6190	738.751	1211.755	861.468	0.722	519.179	0.722	519.179	519.179	0.884	684.188
4	1.983	29.995	0.6539	762.253	1090.782	1030.069	0.884	684.188	0.884	684.188	684.188	0.916	710.887
5	11.070	39.383	0.6633	761.841	972.173	1052.083	0.916	710.887	0.916	710.887	710.887	0.916	710.887
RADIAL POSITION	DIFFUSION FACTOR	ST. PRESS. RISE COEFF	CH1	INLET ABS. TANG. VEL	EXIT ABS. TANG. VEL	INLET REL. TANG. VEL	EXIT REL. TANG. VEL	INLET ABS. TANG. VEL	EXIT ABS. TANG. VEL	INLET ABS. TANG. VEL	EXIT ABS. TANG. VEL	INLET ABS. TANG. VEL	EXIT ABS. TANG. VEL
1	0.538	0.28591	0.4147	0.	694.684	1468.221	757.413	0.888	0.888	0.888	0.888	0.888	0.888
2	0.524	0.37773	0.4830	0.	642.347	1330.364	688.777	0.841	0.841	0.841	0.841	0.841	0.841
3	0.627	0.44316	0.5189	0.	686.907	1197.066	524.848	0.683	0.683	0.683	0.683	0.683	0.683
4	0.571	0.47597	0.5036	0.	765.422	1051.527	325.360	0.944	0.944	0.944	0.944	0.944	0.944
5	0.472	0.47451	0.5981	0.	756.860	885.896	215.313	1.200	1.200	1.200	1.200	1.200	1.200
RADIAL POSITION	ADIABATIC EFFICIENCY	POLYTROPIC EFFICIENCY	TOT. PRESS. RATIO	TOT. TEMP. RATIO	FIXED INSTRUMENTATION	PRESSURE RATIO	ADIABATIC EFF.	POLYTROPIC EFF.	NOZZLE WEIGHT FLOW	L.E. CHECK WEIGHT FLOW/NOZ.	T.F. CHECK WEIGHT FLOW/NOZ.	WEIGHT FLOW	WEIGHT FLOW
1	0.6790	0.7084	2.000	1.323		1.9320							
2	0.7942	0.8129	1.983	1.272		0.8131							
3	0.7303	0.7525	1.852	1.264		0.8296							
4	0.8468	0.8612	2.032	1.265		232.06							
5	0.8747	0.8859	1.951	1.241		0.9889							
PERCENT DESIGN SPEED = 110													

PARAMETERS DETERMINED FROM FIXED INSTRUMENTATION

RADIAL POSITION	TOT. PRESS. LOSS PARAM	ADIABATIC EFFICIENCY	LOSS COEFFICIENT	TOT. PRESS. RATIO	TOT. TEMP. RATIO
1	0.0675	0.7125	0.2756	1.943	1.293
2	0.0409	0.8196	0.1776	1.981	1.263
3	0.0469	0.7833	0.2199	1.855	1.246
4	0.0380	0.8638	0.1556	1.922	1.238
5	0.0200	0.9372	0.0895	1.950	1.224

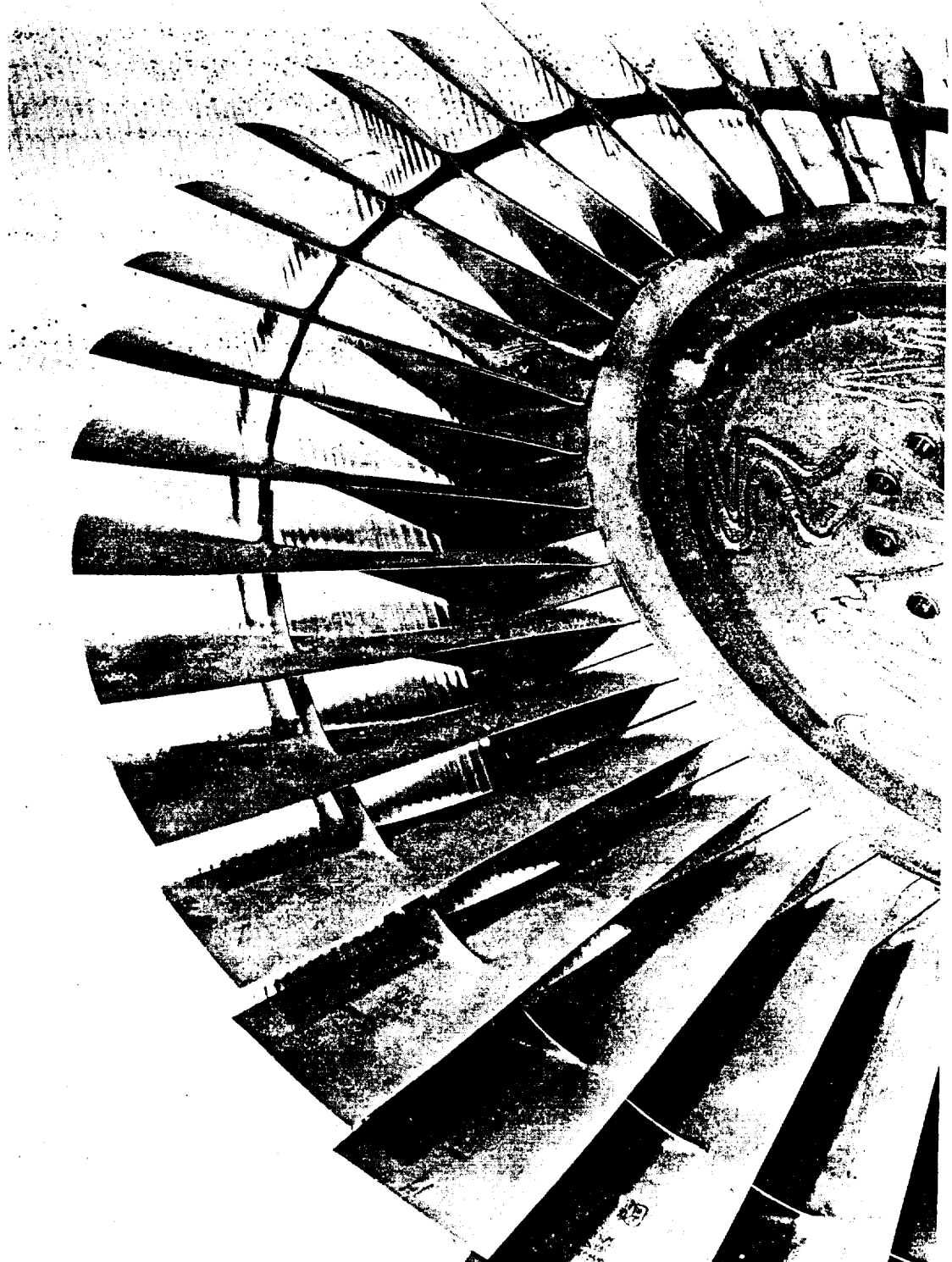


Figure 1(a). - Partial view of Rotor 2D.

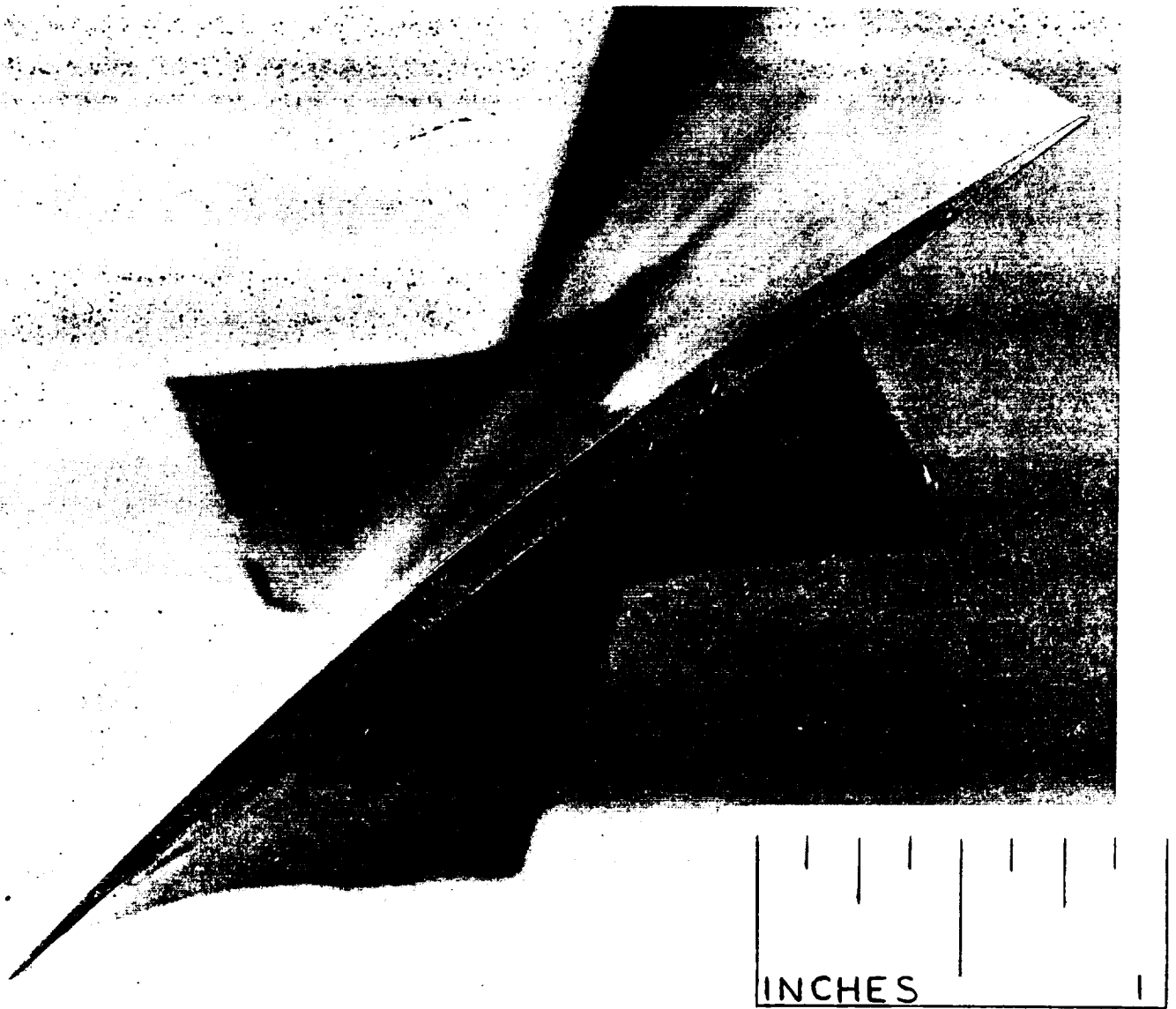


Figure 1(b). - Close-up view of tip section of Rotor 2D.

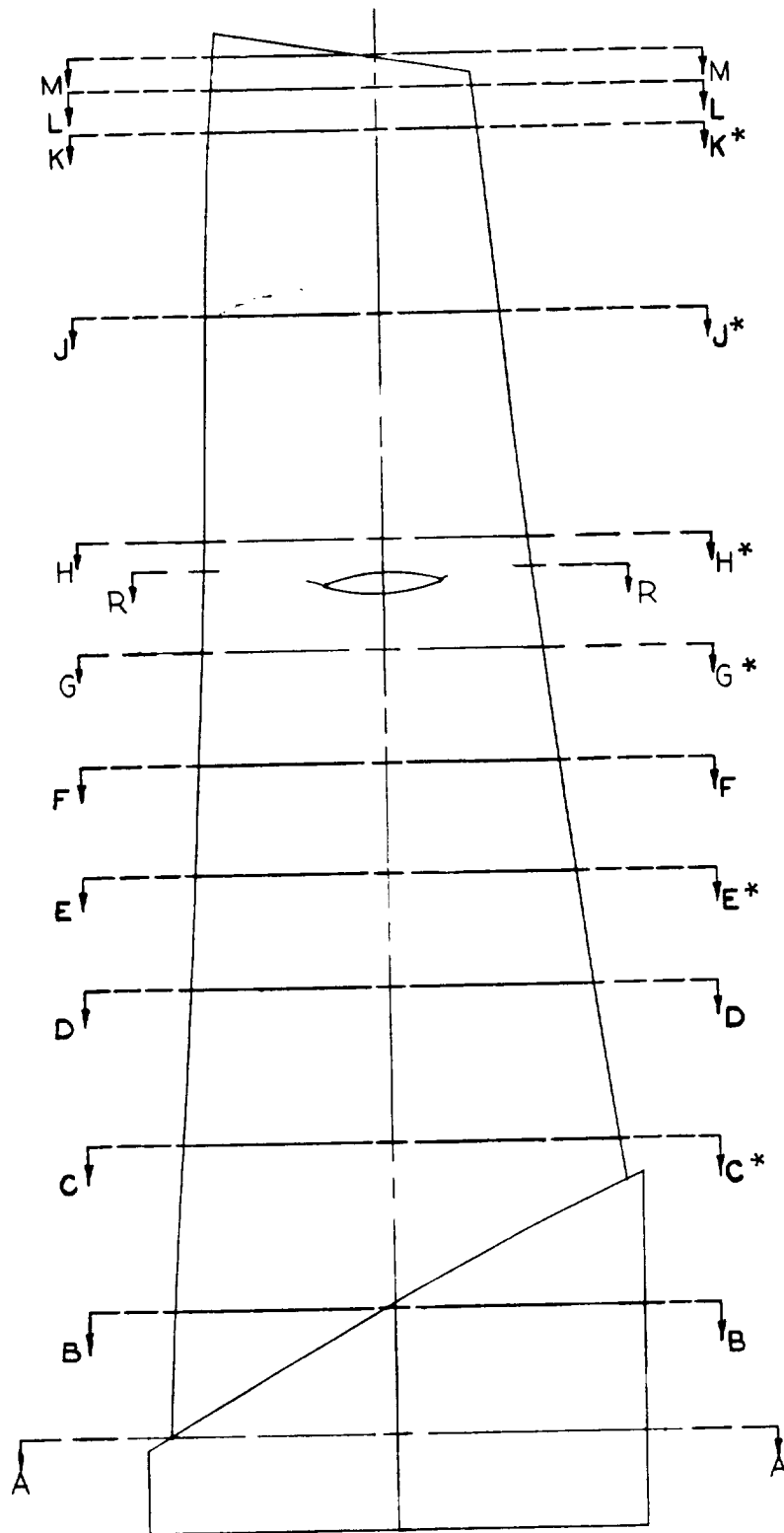


Figure 2. - Meridional view of rotor. Probograph inspection sections are indicated by asterisks.

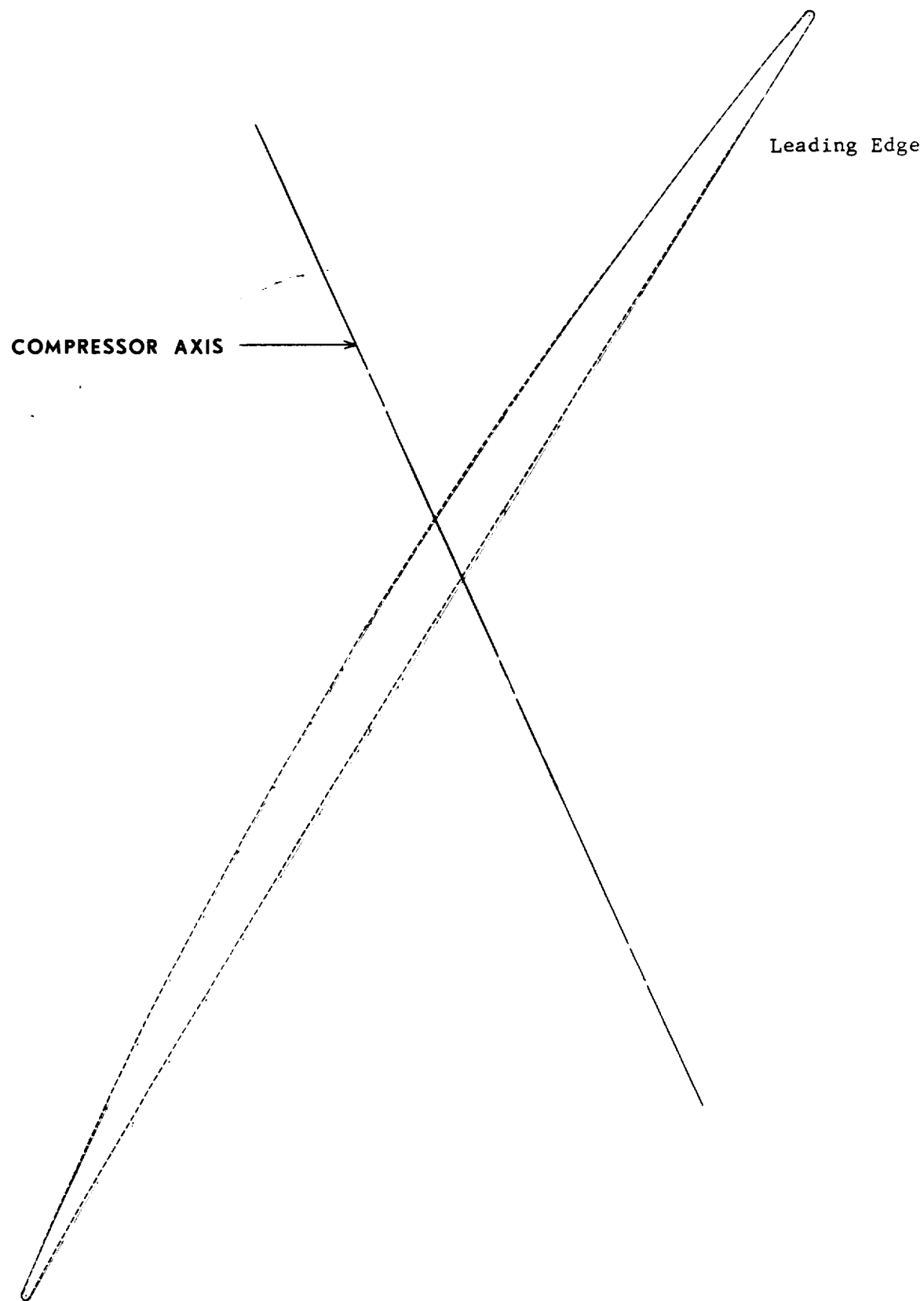


Figure 3(a). - Cylindrical cut of blade at section KK. The solid line represents design intent and the dashed line represents the average of six measured samples.

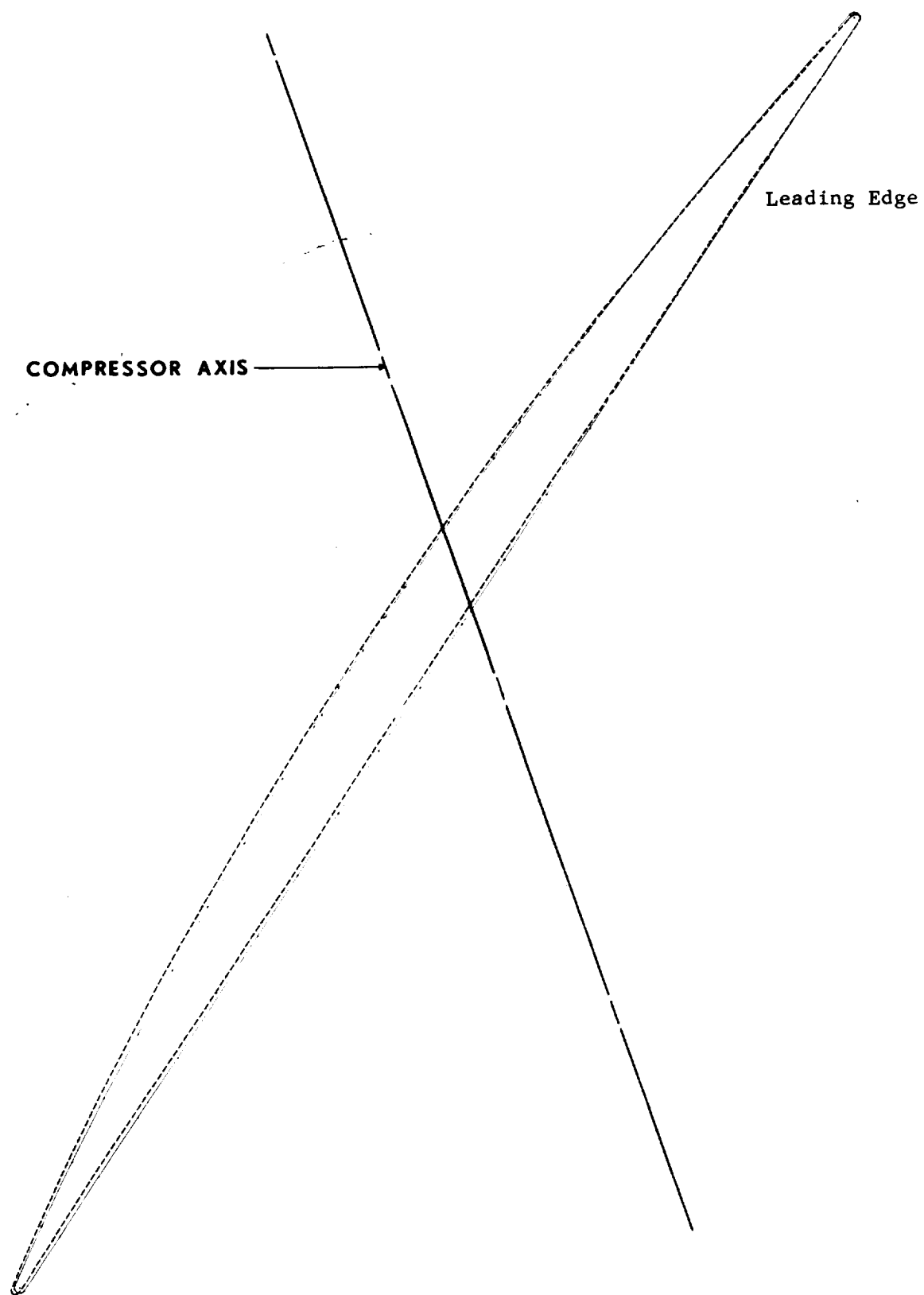


Figure 3(b). - Cylindrical cut of blade at section JJ. The solid line represents design intent and the dashed line represents the average of six measured samples.

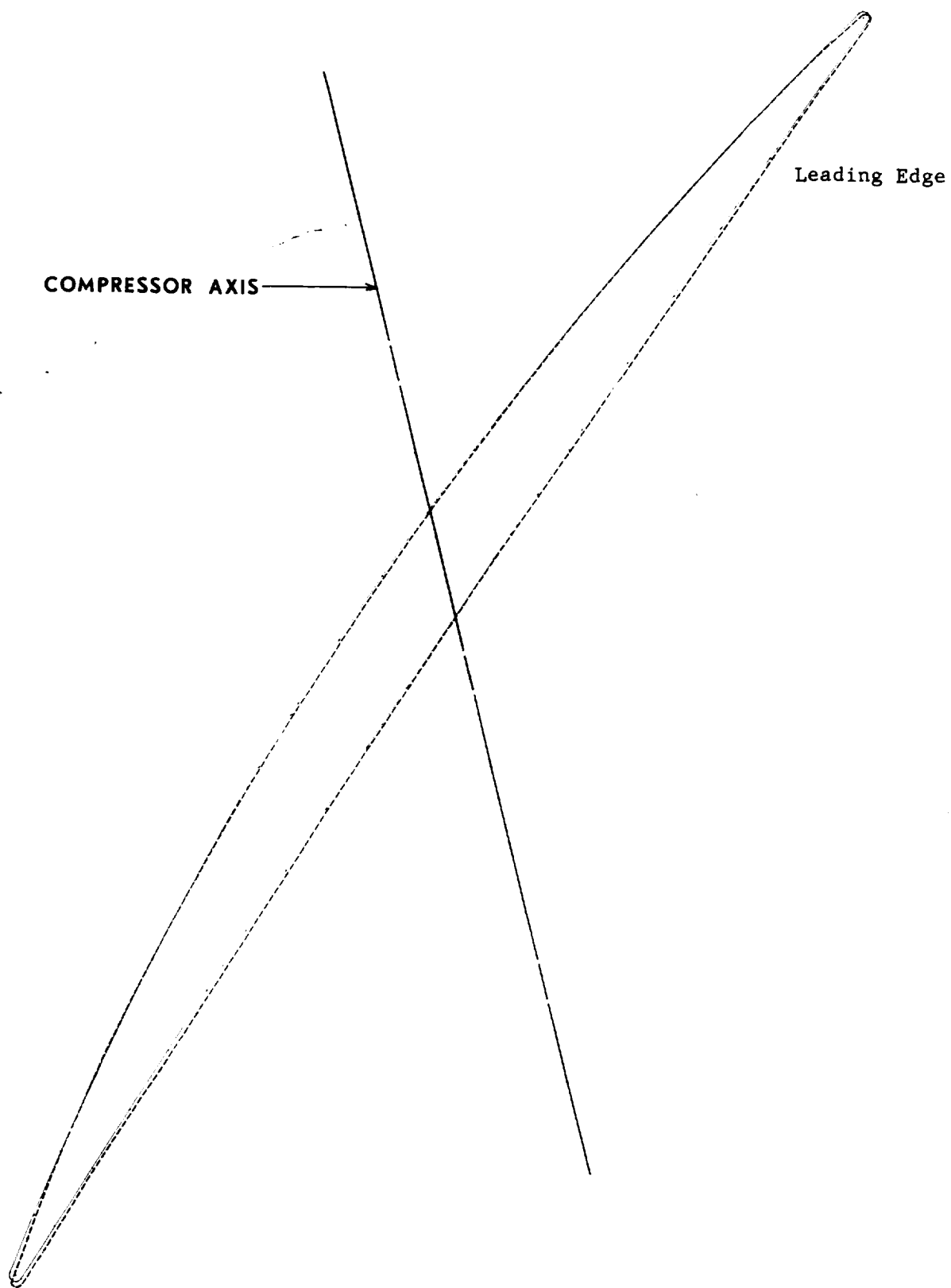


Figure 3(c). - Cylindrical cut of blade at section HH. The solid line represents design intent and the dashed line represents the average of six measured samples.

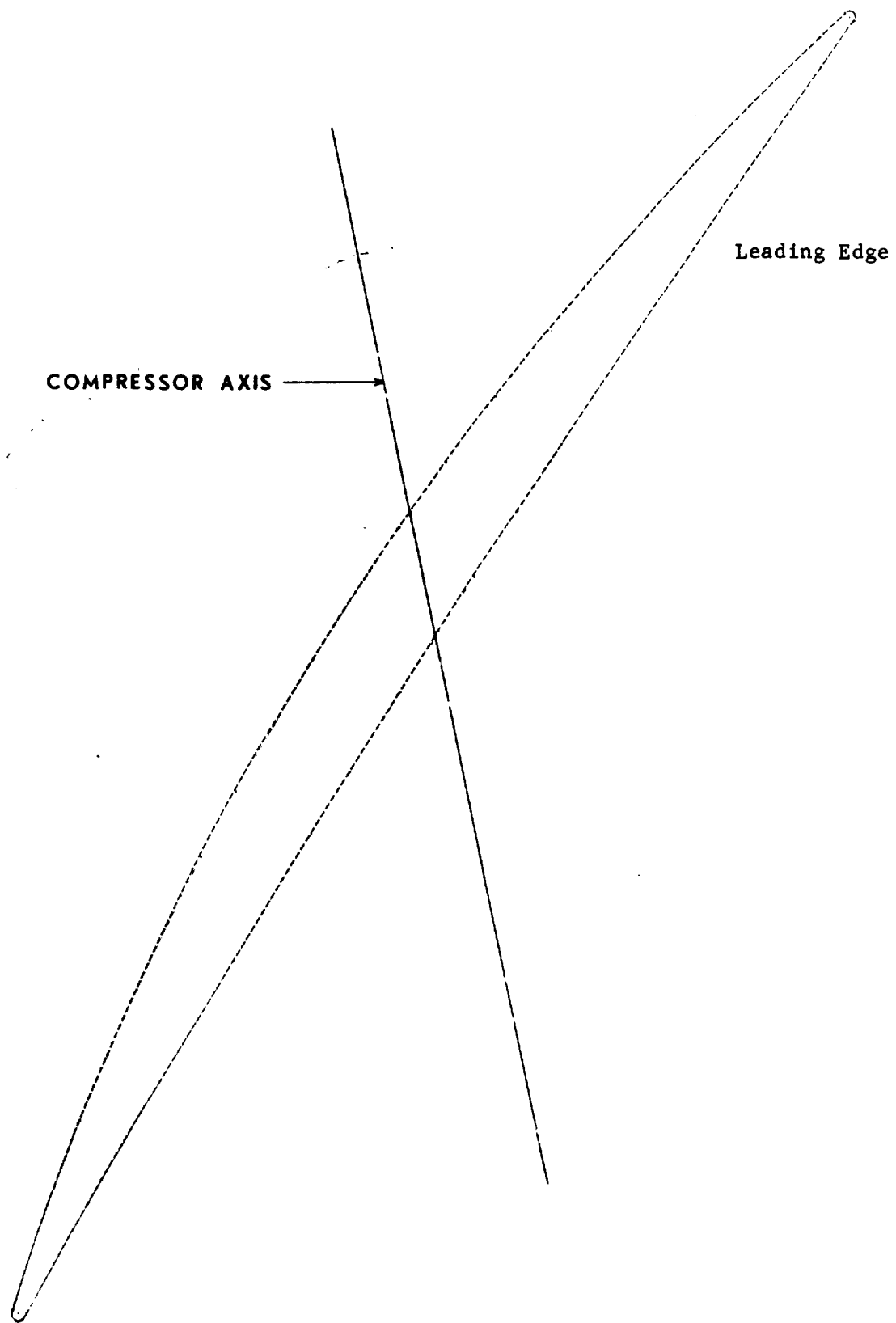


Figure 3(d). - Cylindrical cut of blade at section GG. The solid line represents design intent and the dashed line represents the average of six measured samples.

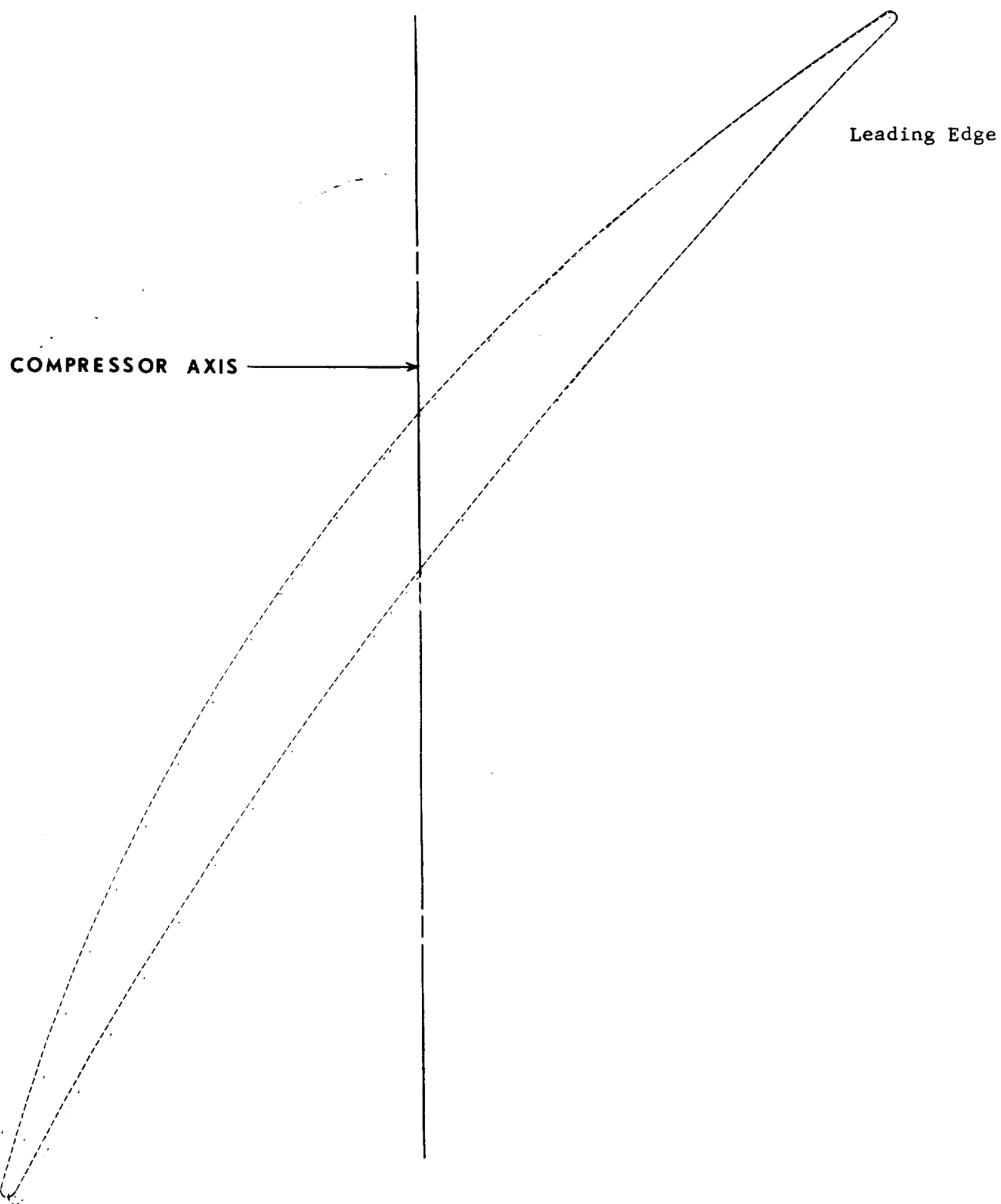


Figure 3(e). - Cylindrical cut of blade at section EE. The solid line represents design intent and the dashed line represents the average of six measured samples.

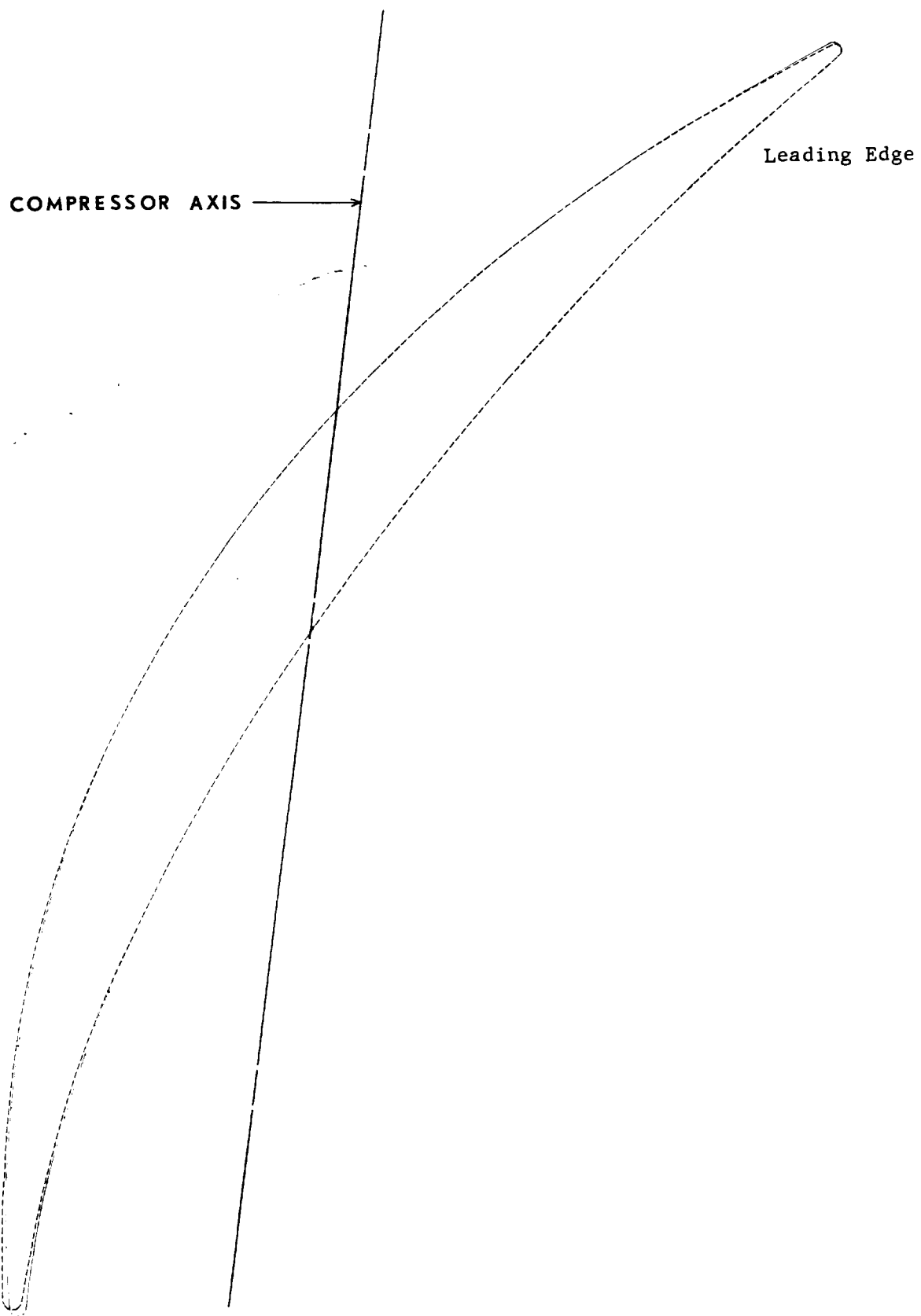


Figure 3(f). - Cylindrical cut of blade at section CC. The solid line represents design intent and the dashed line represents the average of six measured samples.

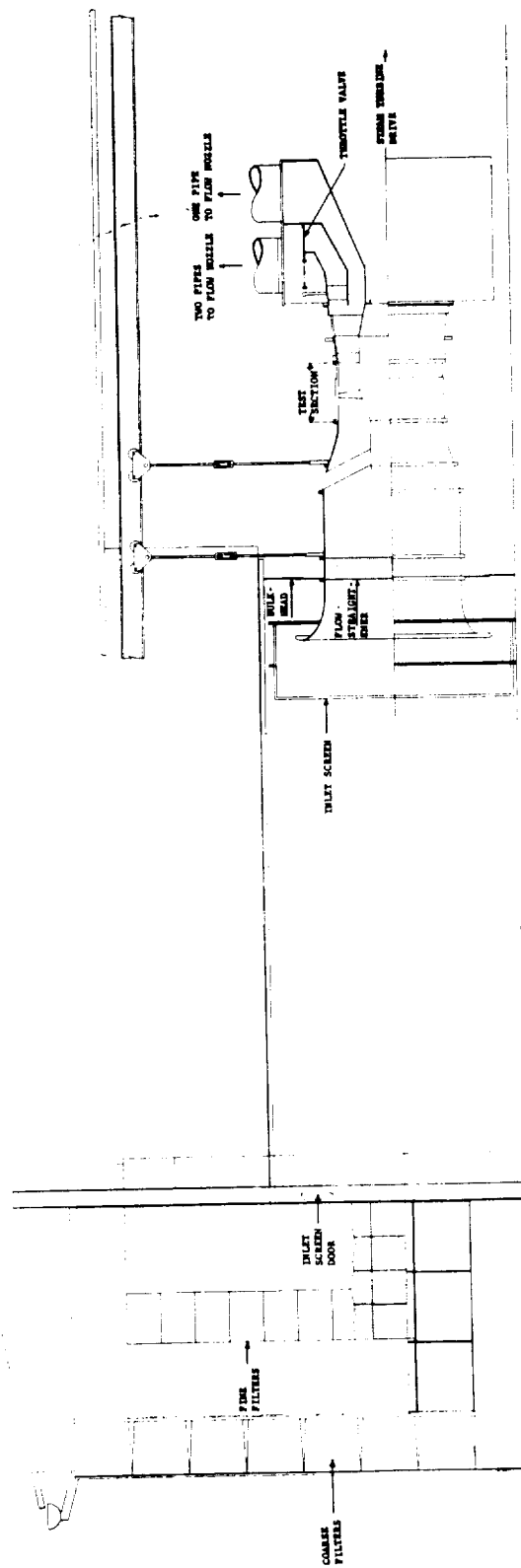
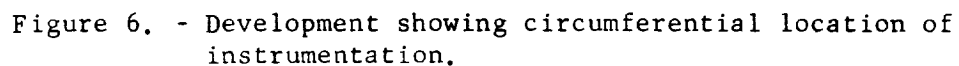
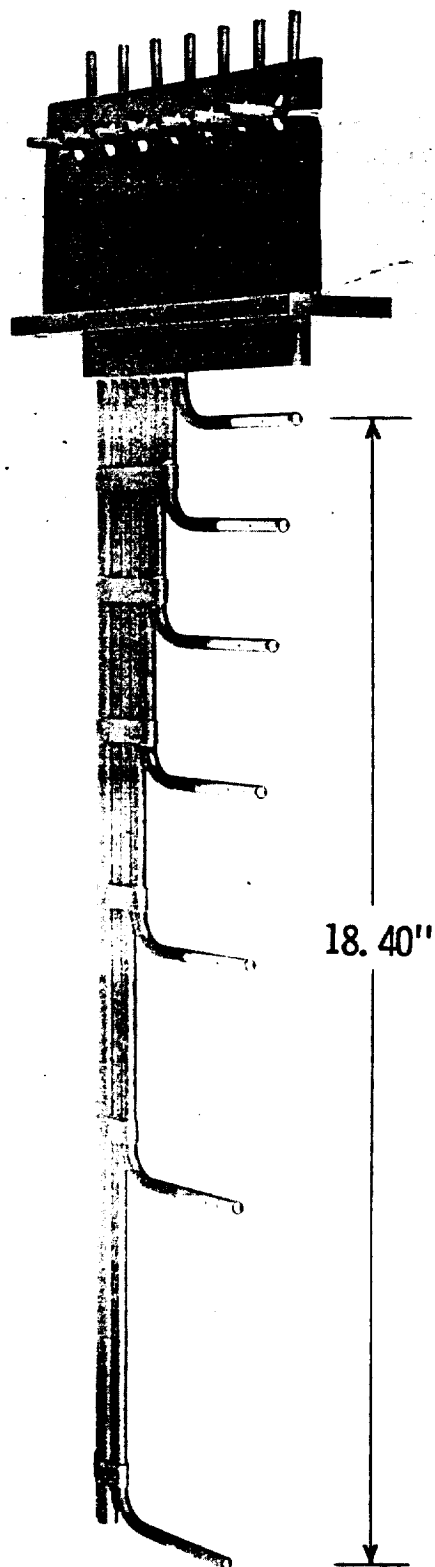


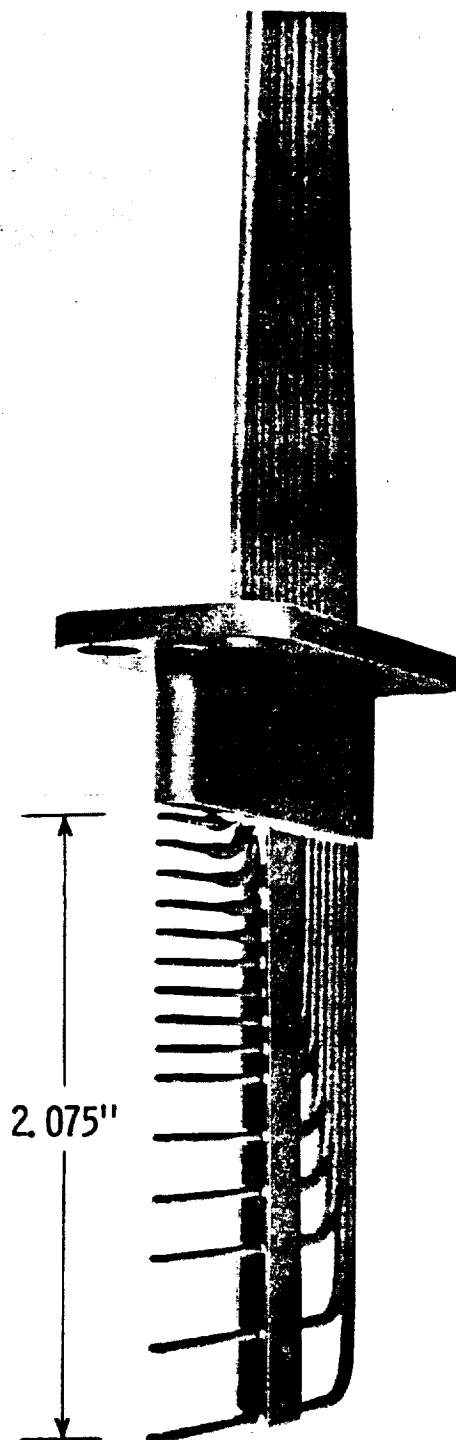
Figure 4. - House Compressor Test Facility.

Figure 5. - Meridional view showing location of instrumentation.



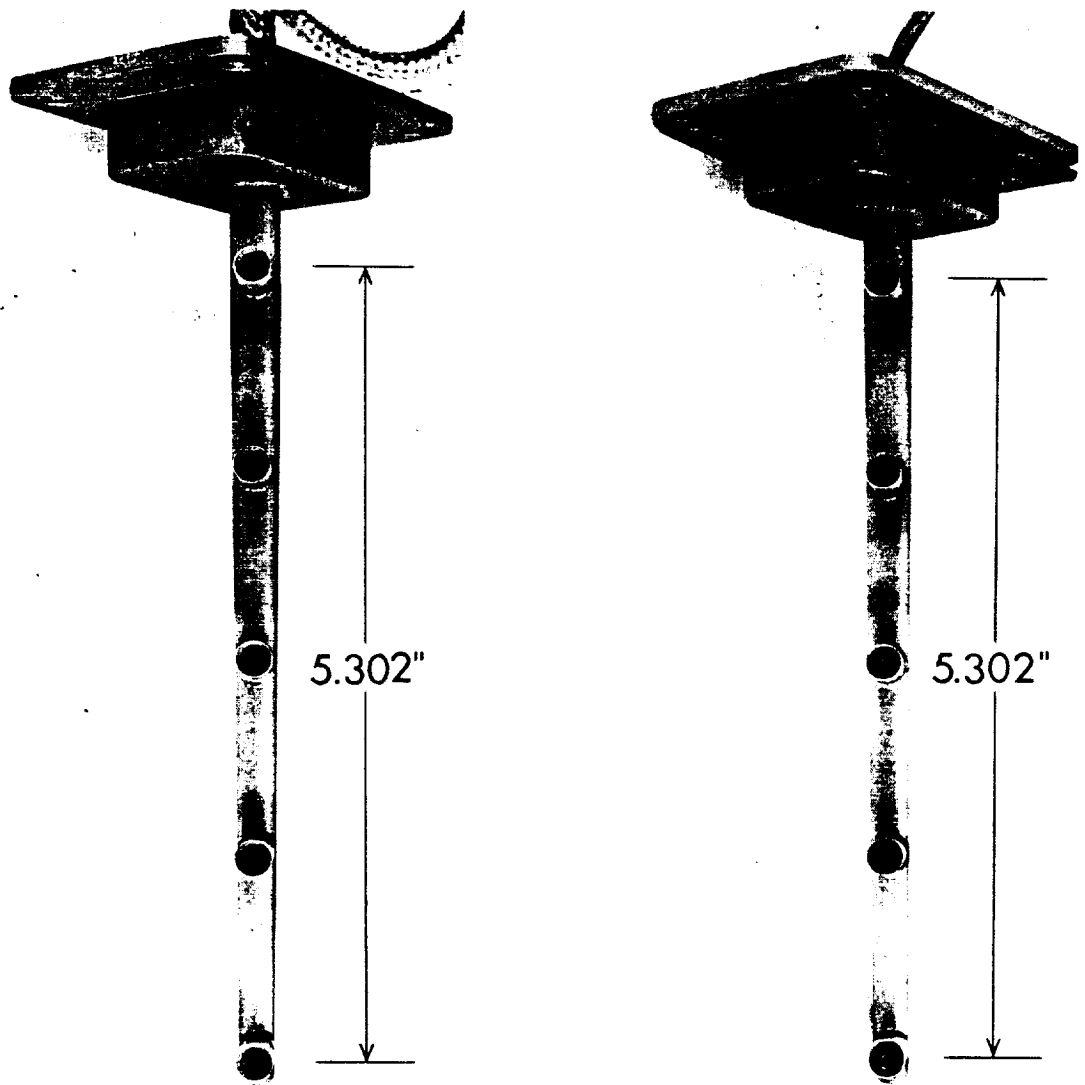


(a). - Inlet pitot-static rake.



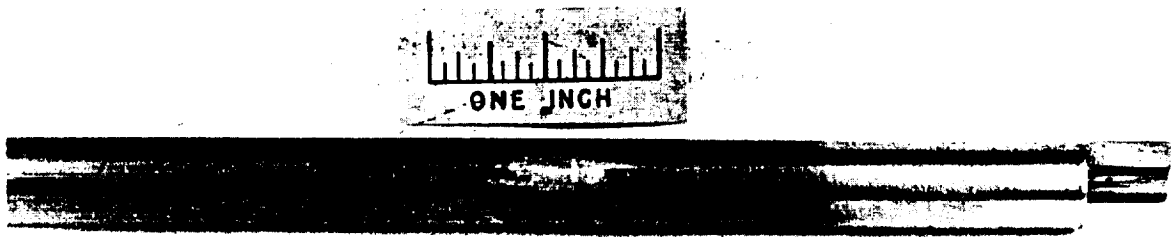
(b). - Casing boundary layer rake.

Figure 7. - Photographs of fixed instrumentation.

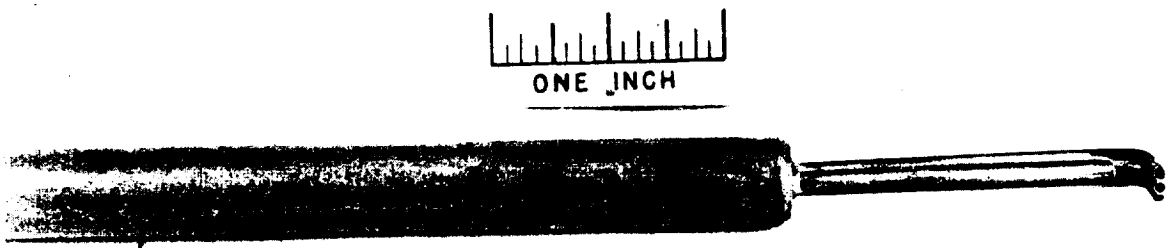


(c). Discharge total temperature rake. (d). Discharge total pressure rake.

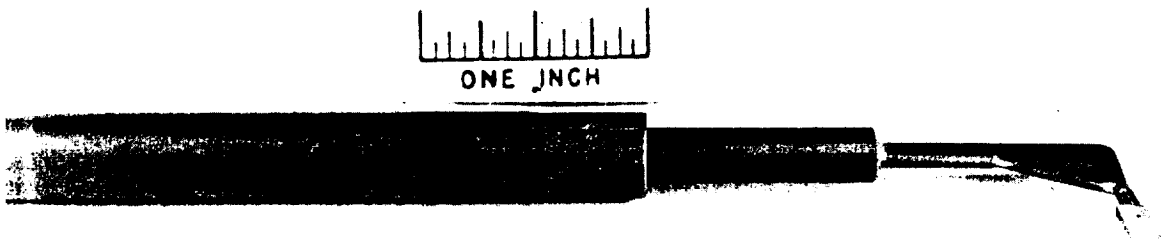
Figure 7. - Photographs of fixed instrumentation.



(a). - Shielded hot wire probe.



(b). - Cobra probe for sensing flow angle, total pressure and total temperature.



(c). - Wedge probe for sensing static pressure.

Figure 8. - Photographs of traverse instrumentation.

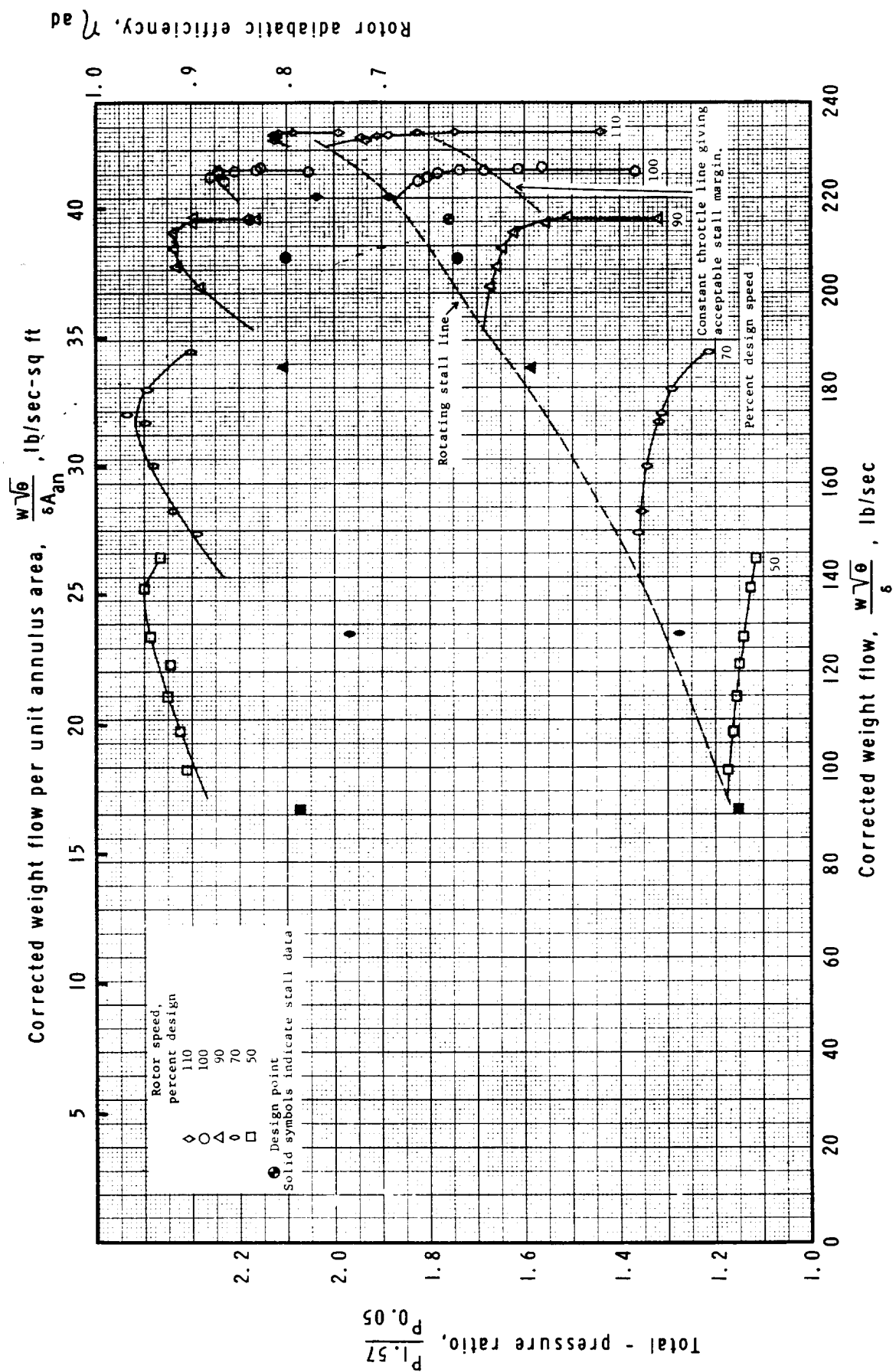
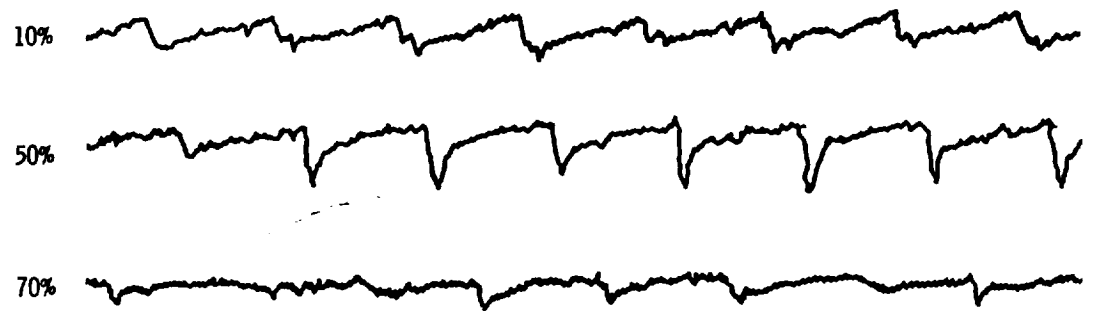


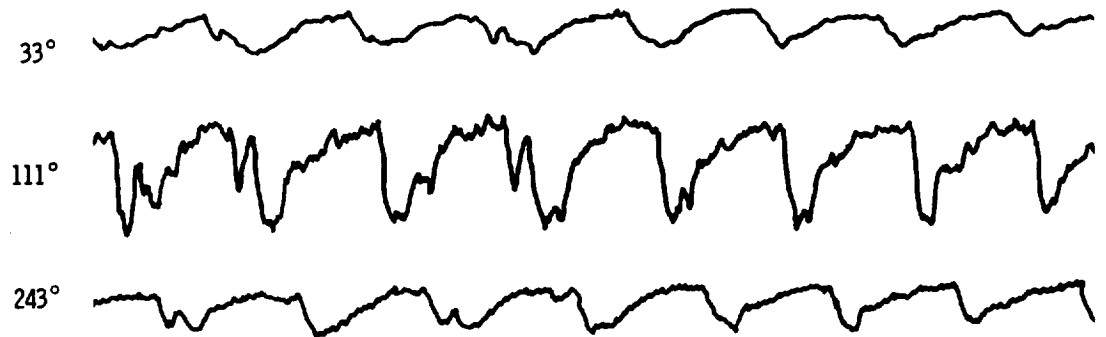
Figure 9. - Rotor performance map.

Immersion



(a) Sample of hot wire anemometer traces at 90 percent design rotor speed.

Circumferential probe position



(b) Sample of hot wire anemometer traces from 10 percent immersion at 90 percent design rotor speed.

Rotor speed, percent design	Number of stall cells	<u>Stall cell speed</u> Rotor speed	Radial extent of stall cell	Throttle setting at stall
50	2	.68	Full span	4.10
70	3	.69	Full span	5.45
90	1	.59	Full span	8.45
100	1	.61	Full span	10.10
110	1	.61	Full span	10.70

(c) Tabulation of stall data

Figure 10. - Sample hot-wire traces and tabulation of stall data.

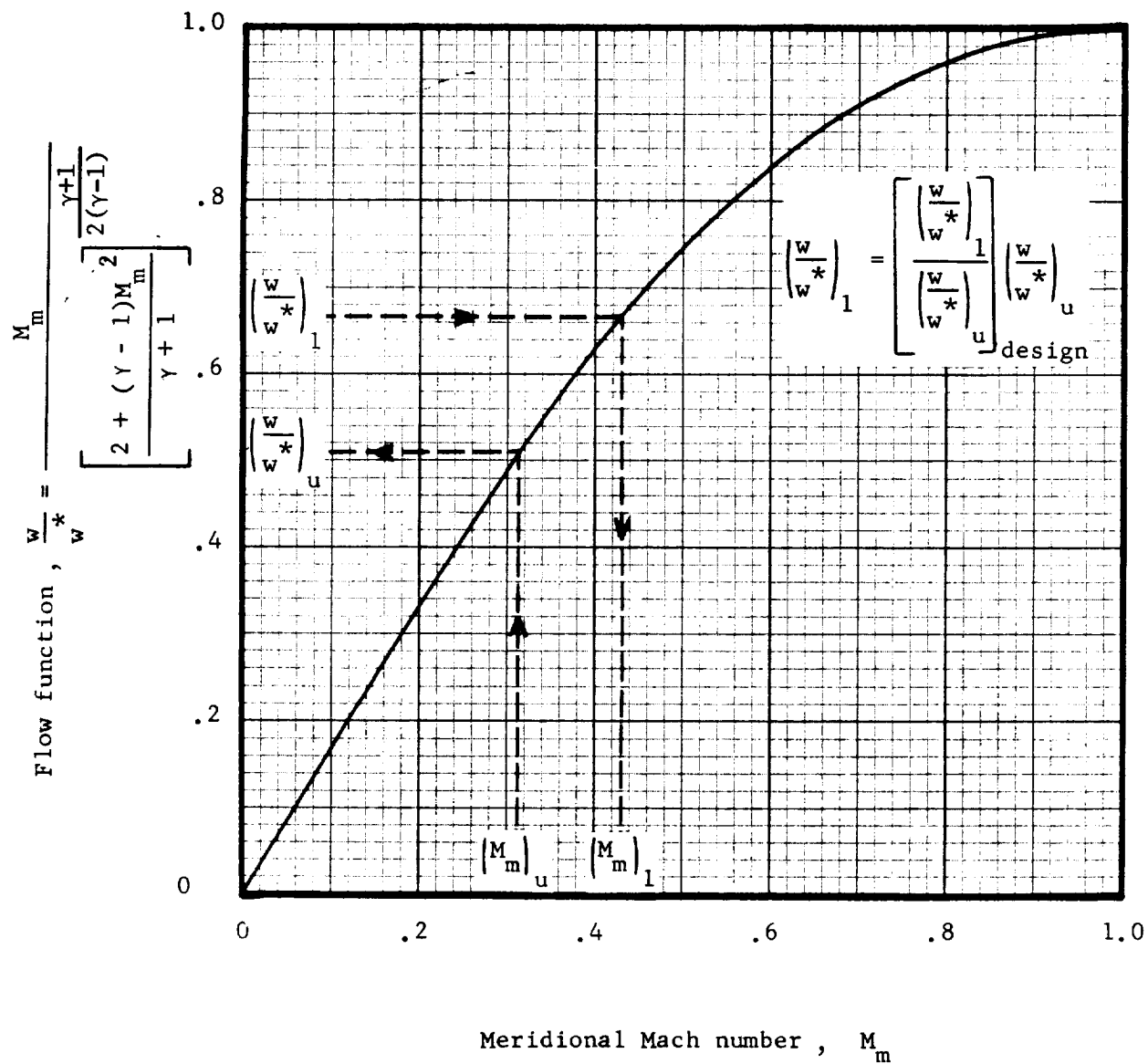


Figure 11. - Relationship between flow function and meridional Mach number - used for transferring traverse measurements to blade edges. Dashed lines with arrows and inset formulas indicate calculation sequence for sample case at leading edge.

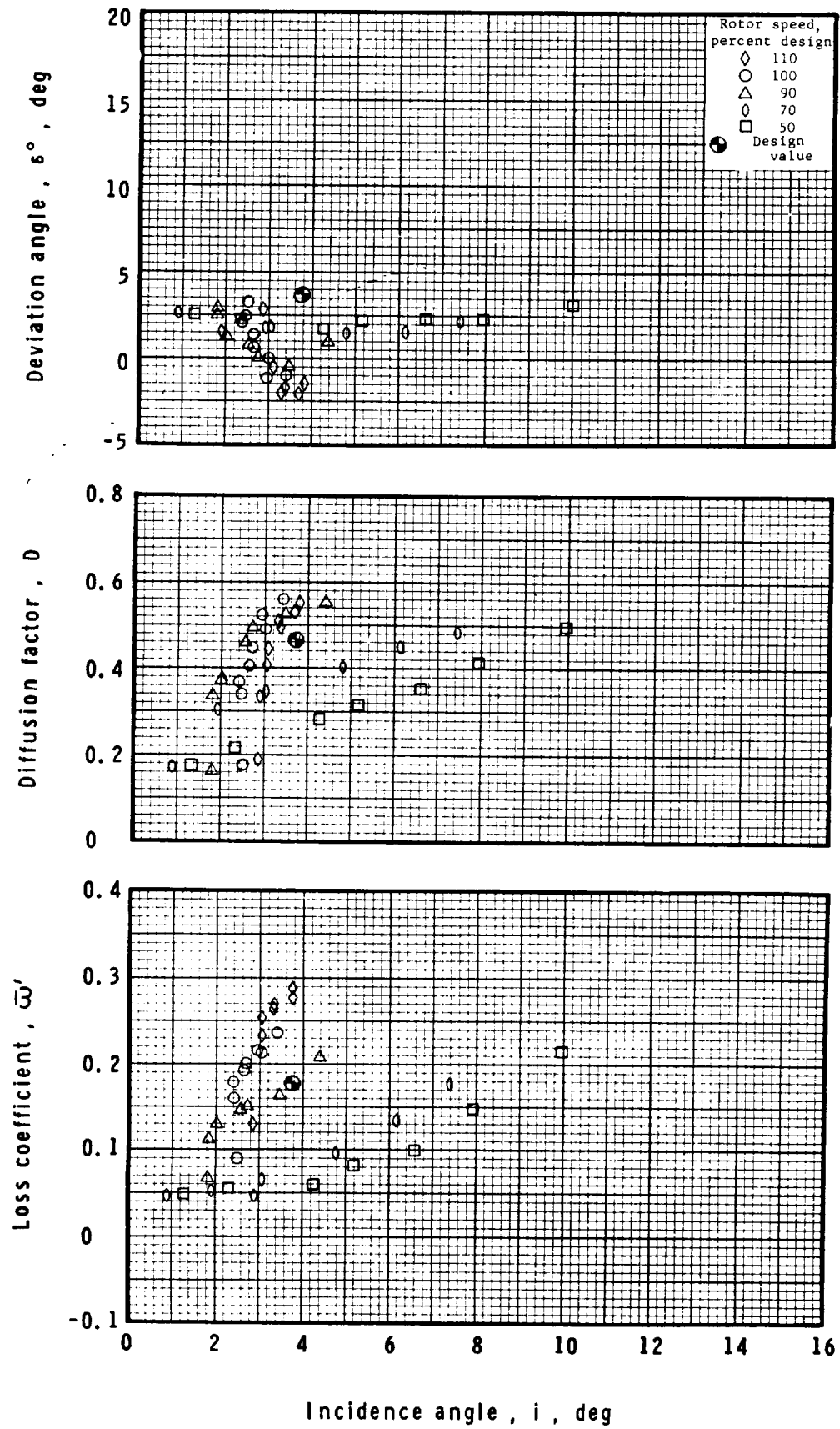


Figure 12(a). - Blade element data measured at 10% immersion from tip.

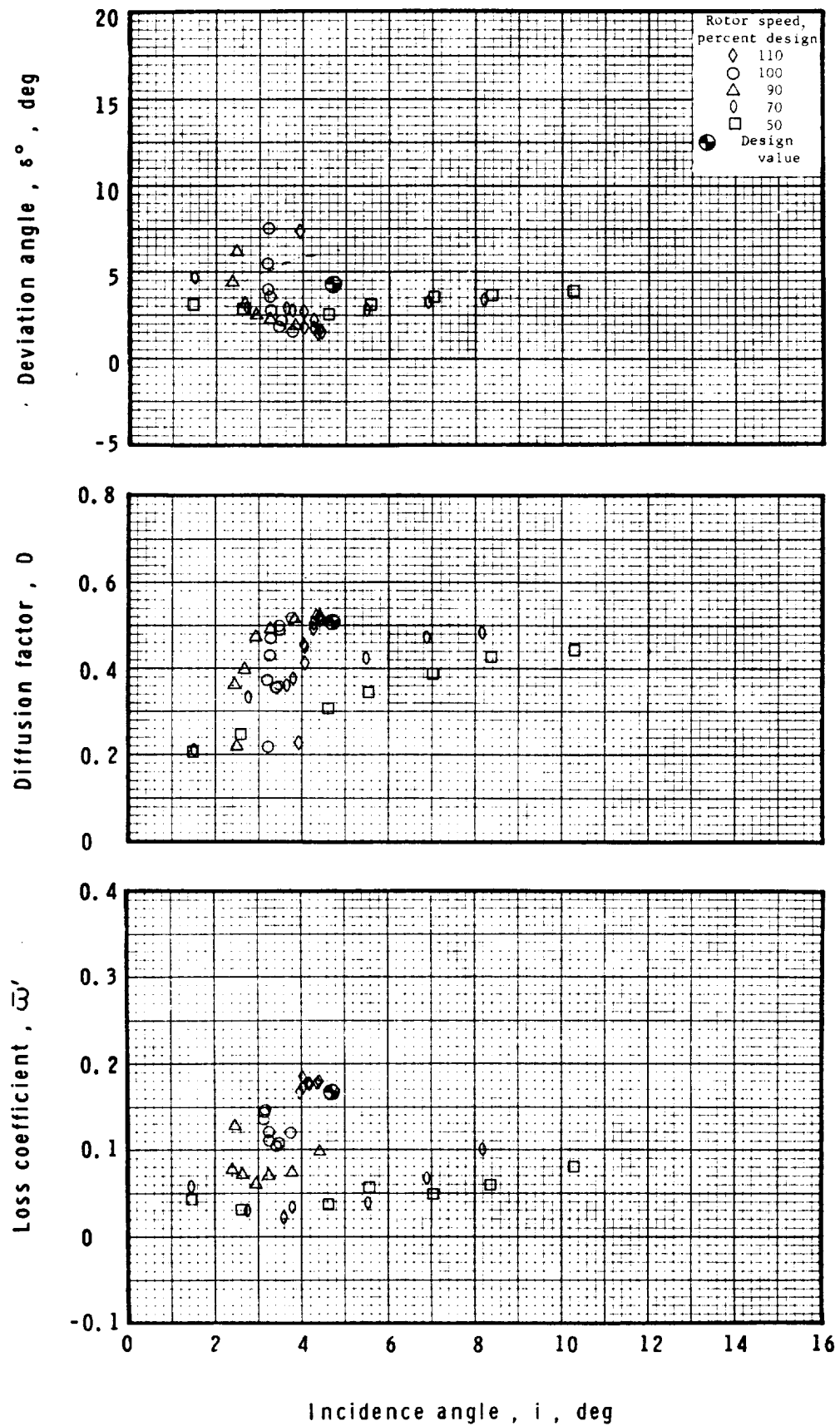


Figure 12(b). - Blade element data measured at 30% immersion from tip.

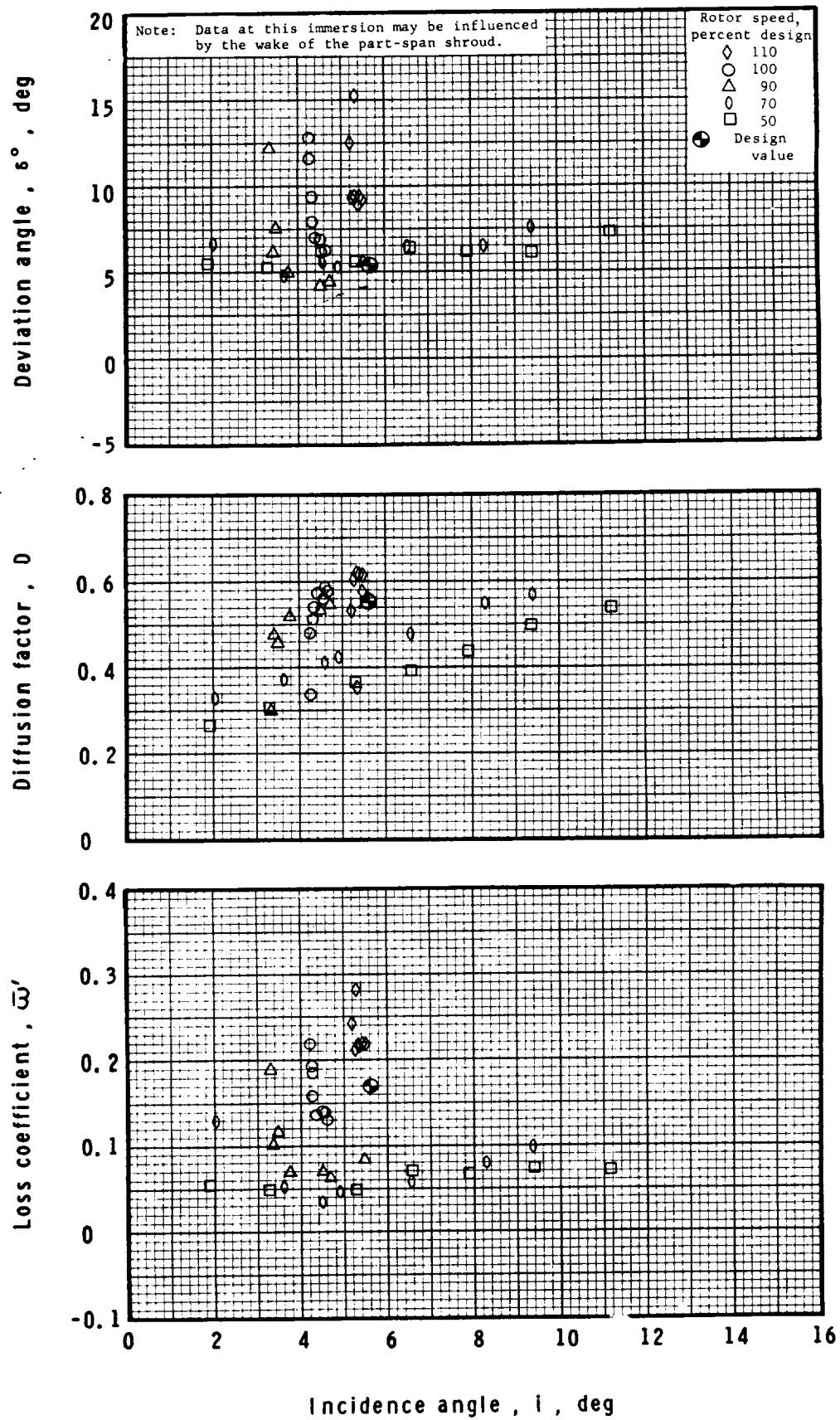


Figure 12(c). - Blade element data measured at 50% immersion from tip.

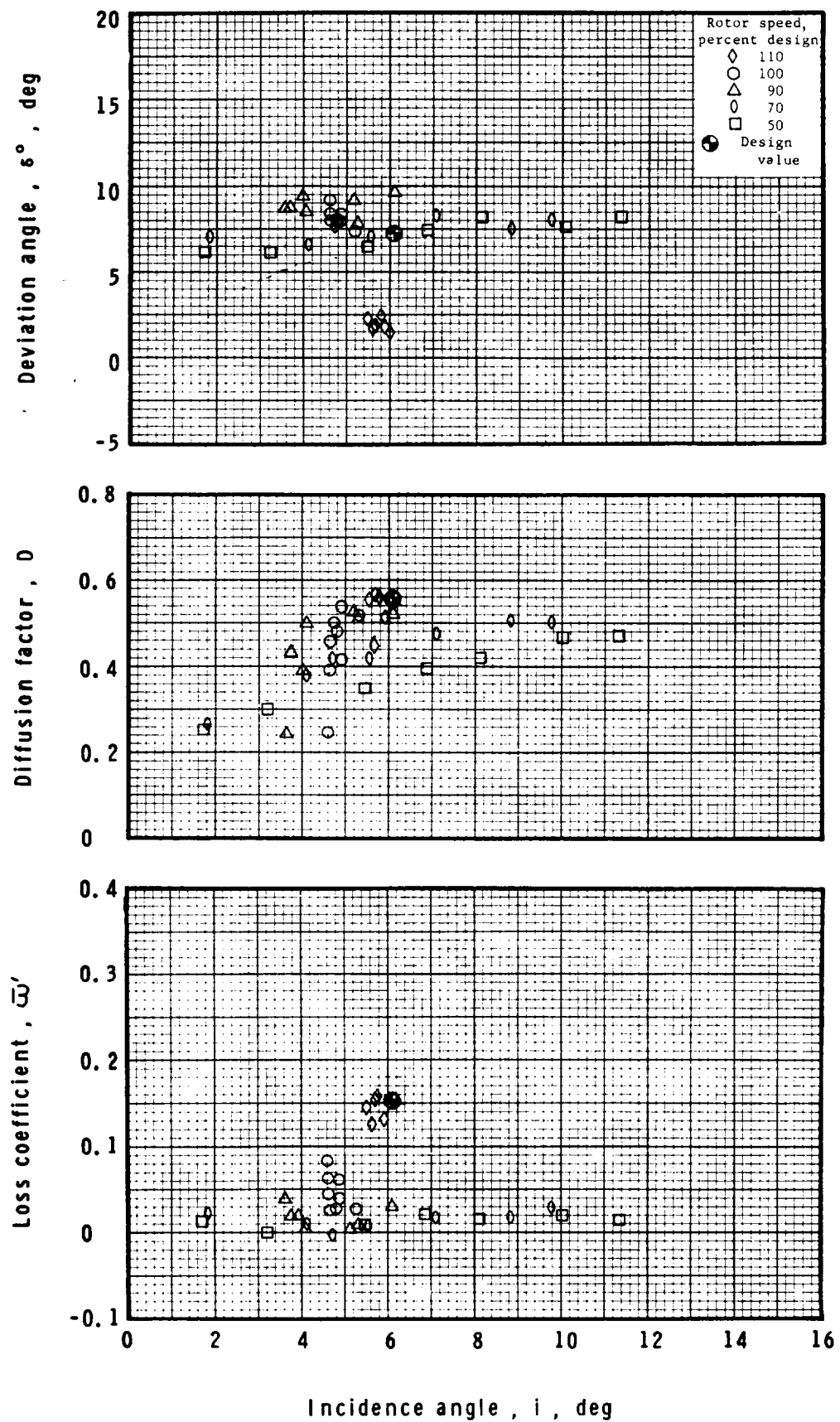


Figure 12(d). - Blade element data measured at 70% immersion from tip.

